DR. TRUMAN W. BROPHY.

The Technique of Inlay Making by the Direct and Indirect Method.

By F. T. Van Woert, M.D.S., Brooklyn, N. Y.

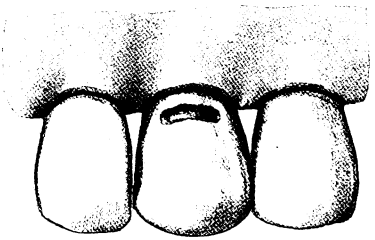
II.

The Technique of Taking Impressions.

There are some disadvantages in the direct method, the principal one of which is that in the event of failure the entire operation must be repeated in the mouth of the patient. This is more than likely to be the case in porcelain work, because of the difficulty of obtaining the suitable color and contour and the possible chance of warping the matrix. In cast inlays there is danger of not forcing the wax to all of the margins of the cavity, particularly at the cervix. Often this is not observed in the mouth, and the filling is cemented to place, leaving a defect which later proves disastrous. There is also a chance of failure in the improper investing or casting of the filling. This might happen several times before the desired result is obtained, which brings very little credit to the operator and is often construed by the patient as a lack of knowledge and skill. On the other hand a number of impressions might be taken at a sitting without the patient realizing that only one would have been necessary if properly manipulated.

The Impression Method of Making Inlays.

The impression or indirect method is the taking of an impression of a cavity and making from it a die or mold of said cavity, from which the matrix or wax pattern is formed. After the production of the model of the cavity the procedure is the same as in the direct method.



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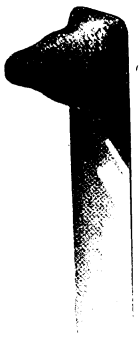

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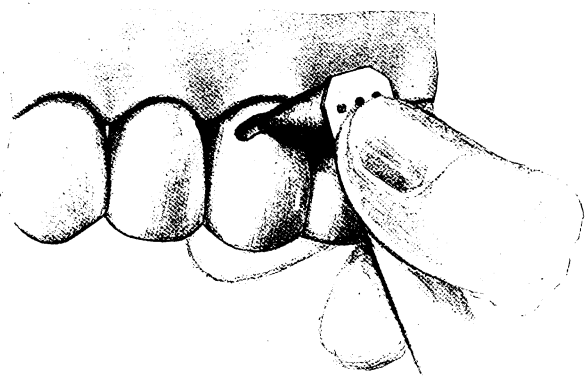

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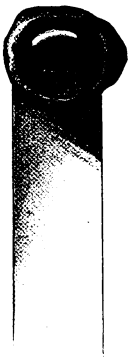
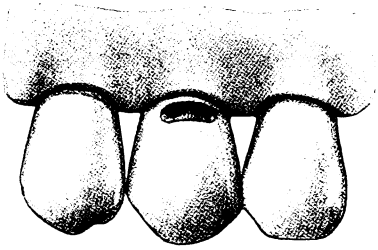


21e

It is a fact that the further from the original the final operation is the less chance there is of success, but in the art of inlay making there is a possibility that in the indirect method, which is only two steps removed from the original, we might be selecting the lesser of two evils, presuming, of course, that a correct impression can be obtained, and from this impression a perfect die or mold made. I am thoroughly convinced that a perfect impression can be obtained of any cavity where it is possible to remove, without distortion, a wax filling or a gold or platinum matrix.

Metal for Impression Inlays.

Careful consideration must be given to the technique. First, we need a suitable metal for the forming or making of trays or impression cups. German silver, soft brass, or other like metals may be used, but I have found platinoid (an alloy of nickel and silver) to be the best. It is procurable in squares of about three inches of Numbers 32, 34 and 36 gauge (B. & S. wire gauge). This metal is highly polished, does not tarnish with moderate heating, and while very pliable has enough resistance to maintain its shape under the pressure required.



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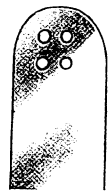

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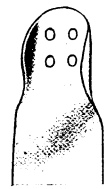

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Impression Material.

Second, we must have a suitable impression material, one possessing the qualities of softening at a low temperature, reproducing sharp detail, hardening or cooling rapidly, and brittle enough to prevent warping or springing. There are a number of compounds recommended composed of various materials, such as shellac, rosin, wax, etc., but I have found in the compound known as Kerr's, and marketed by the Detroit Dental Mfg. Co., a material which seems almost ideal.

Alloy for Dies or Molds.

Third, it is essential to have a suitable alloy for the making of dies. Copper amalgam has been advocated by many, also Spence metal and the cements, but my experience leads me to believe that a good silver and tin amalgam is by far the best for our purpose.

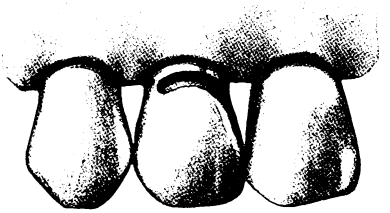
Special Impressions Trays Advocated.

I believe a suitable cup should be made for each individual case, so that a pressure will be exerted at a direct right angle to the cavity margins (as advocated by Dr. Taggart). Dr. Taggart, when making porcelain inlays, takes an impression, removes it and chills it, and then, with a small pointed flame, he reheats rapidly that surface which comes in contact with the cavity and replaces it and chills with compressed air or ice water.

Personally, I believe that an accurate impression can be taken without the second heating and insertion if the cup or tray is properly formed.

Taking Impressions of Labial, Buccal and Lingual Cavities.

In a simple labial cavity (such as is seen in Fig. 21, a), which shows a small cavity in a central incisor, a strip of platinoid is cut to shape (as shown in Fig. 21, b), and perforated with a plate punch, the holes aiding in holding the impression compound in place. A small mass of the Kerr impression compound is softened over a flame and made into a cone, which is attached to the impression tray (as shown in Fig. 21, c), the



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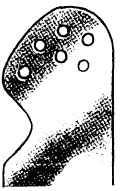

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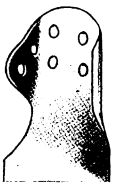

23c

metal tray being heated sufficiently to assure a strong attachment. The cone is then thoroughly chilled by holding in cold water, after which the point of the cone is heated in the flame and rapidly carried to and pressed into the cavity, having the index finger resting against the lingual side of the tooth, while the thumb carries the compound to place and holds it rigidly during the cooling (as shown in Fig. 21, d). In some instances it may be more convenient to reverse the position of the fingers, having the thumb upon the lingual side. Those who have assistants may hasten matters by having the assistant spray cold water upon the tray and compound, thus hardening it almost instantaneously. If the cavity has been properly prepared and the impression properly taken the impression should be dislodged with some difficulty, which shows that the cavity is properly shaped for retention. This point is important, and any impression which leaves a cavity too easily should cause a close scrutiny, first of the impression itself, to see whether the margins are well delineated. If the imprint of the margins do show up sharply defined, then the cavity itself should be examined to make sure that there is sufficient retention provided for in its formation. The impression of the cavity shown in Fig. 21, a, is seen in Fig. 21, e.

This method is applicable to all cavities on the labial, buccal or lingual surfaces where the cavities do not extend below the free margin of the

gum. In such cases it is well to press the gum away if possible prior to taking the impression Often this can easily be done by packing the cavity with cotton saturated with sandarac varnish or with temporary stopping. With either it is usually wise to throw a silk ligature around the neck of the tooth and tie the dressing or stopping tightly into place. Sometimes the cavity can be perfectly prepared at the first sitting. If so, this should be done, because some hemorrhage is often unavoidable, and if all in-

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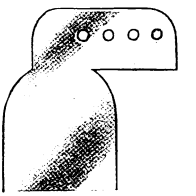

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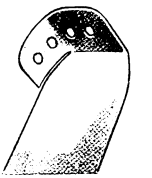

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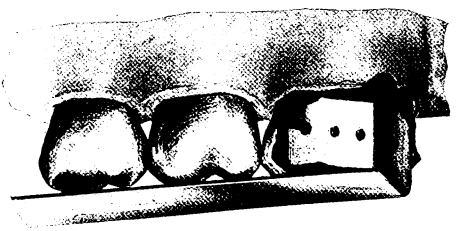

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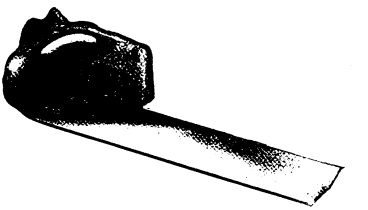
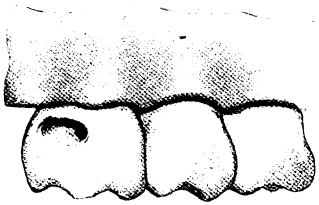


24e

strumentation is done at the first sitting, and the packing then inserted, a comparatively dry field of operation will present at the second sitting, with the upper margin of the cavity well in view, and the impression is as readily procured as in the case already described.

Where the cavity is so far below the free margin of the gum that the soft tissues cannot be entirely pushed away, then the tray should be so shaped and curved that one edge of it may be forced under the gum and between the soft tissues and the concealed margin of the cavity. The compound is attached to the tray as before, just the extreme edge of the tray being left uncovered. The tray is introduced so that the edge passes under the gum and beyond the concealed margin of the cavity, when it is forced down against the tooth and held with thumb and index finger, as shown in Fig. 21, d.

Where the surface of the tooth is very convex, as, for example, in cuspids, as seen in Fig. 22, a, the tray is first cut as before and punched (Fig. 22, b), and it is then contoured by bending until it will accurately seat over the convexity of the tooth surface. It should be pointed enough at the extremity to fit the festoon of the gum nicely, and it should be wide enough to more than cover the cavity. For the cavity shown in Fig. 22, a, the tray would be formed and contoured as shown in Fig. 22, c. The



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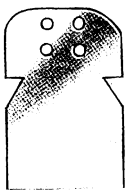

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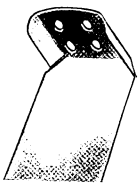

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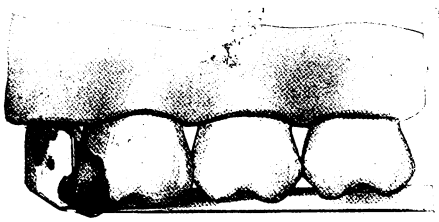

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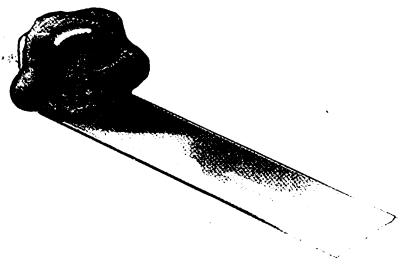

25e

object is always to so fashion the tray that pressure expressed against the tray from the outer side will transmit force through the impresion compound at right angles with every margin of the cavity thus overcoming the tendency of the material to "crawl" away from the margins.

Sometimes a labial cavity may become complicated by extending around the mesial or distal angle encroaching upon the approximal surface. This most often occurs where what was once a simple labial cavity has been imperfectly filled and caries has again supervened. Such a cavity in an upper lateral incisor prepared for filling is shown in Fig. 23, a. To get an impression of this cavity we must provide for this extra depredation and follow the rule that the tray must be wide enough to cover the cavity, and contoured so as to be equally distant from all margins as it is pressed to place. The tray for the cavity under discussion is

seen in Fig. 23, b, where it is shown in the flat, and in Fig. 23, c, where it is contoured to proper shape.

Buccal Cavities.

The same rules and the same methods which apply to labial cavities are equally applicable to buccal, so that perhaps it will only be necessary to illustrate one or two extreme cases. Perhaps one of the most harassing situations in which a cavity may occur is the buccal surface of the third molar, especially where the cavity extends around the distal angle, as seen in Fig. 24, a. The tray for such a case is first cut out and punched, shaped as shown in Fig. 24, b, after which it is bent and contoured into the form seen in Fig. 24, c. It will be observed that this tray can be made in a few moments and without need of soldering. When the compound is added and pressed to place it will be found that the tray carries the material to place so directly that there is no crawling, every margin showing sharp in the impression and resulting die. Fig. 24, d, shows the impression in place on the tooth, and Fig. 24, e, is the impression itself.

Perhaps the most difficult of all surface cavities of this type would be a cavity wholly in the distal surface of a third molar, as shown in Fig. 25, a. The tray for this is quite similar to the last, differing only in the fact that it must have two wings (Fig. 25, b) or extensions, which, when bent up and contoured, provide a tray (Fig. 25, c), which will perfectly carry the impression material to place in a cavity in the distal approximal surface, since it is so formed as to cover that surface and extend around both the buccal and lingual angles. Fig. 25, d, shows the impression in place on the tooth, and Fig. 25, e, is the impression itself. I have had the satisfaction of making porcelain inlays for such cavities that have fitted with absolute accuracy, thus proving the efficacy of the method even in this trying situation.

Dental Radiography.*

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CHAPTER X.

Stereoscopic Radiography.

The word stereoscopic is derived from two Greek words, meaning "solid" and "to see."

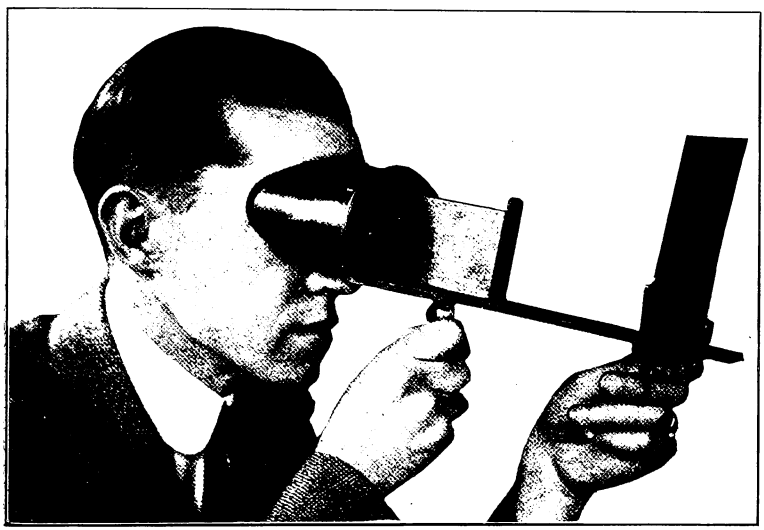


Fig. 322. Hand stereoscope in use.

The phenomenon of the stereoscopic picture or radiograph is one very difficult to explain briefly. It is sufficient for us to say here that to gain a stereoscopic effect—that is, to get a picture rich in perspective—we must have two pictures, one for each eye, and observe them with a stereoscope (Figs. 322 and 323). When the two pictures are properly focused in the stereoscope, the observer no longer sees two flat pictures of the same object, but, instead, the single object stands out in clear perspective, just as it would if we looked at the object itself, the two pictures being registered on the retina of either eye and the merging centre of the brain fusing them into one.

To make stereophotographs it is necessary to use a special, double-lens camera (Fig. 324), which takes a picture for each eye simultaneously. Figs. 337 and 338 are stereophotographs.

A moment's consideration of the subject makes it obvious that two radiographs, one for each eye, cannot be made simultaneously. We must

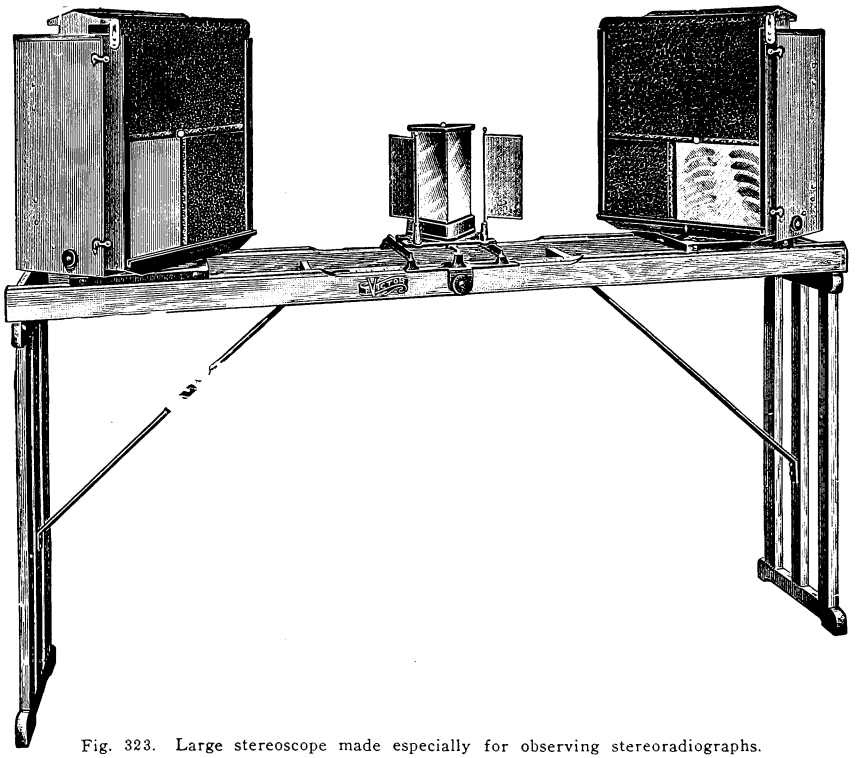


Fig. 323. Large stereoscope made especially for observing stereoradiographs.

place the X-ray tube in the position to make the radiograph for one eye and make the exposure, then shift the tube two and one-half inches (the approximate distance between the eyes), place a new plate or film in exactly the same position occupied by the first plate or film (and this without changing the position of the part being radiographed), and make a second exposure to get the radiograph for the other eye.

Stereoscopic Tube Stand.

To accomplish the proper shifting of the tube a special tube stand or pedestal should be used. There are several such stands on the market known as "stereoscopic tube stands." The one shown in Fig. 61, and again in Figs. 326 and 330, is used by the writer.

Plate Changers.

To accomplish the removal of the first plate after exposure, and replace it with a second plate for the second radiograph, without changing the position of the part being radiographed, it is necessary to use a plate changer (Fig. 325), or a "stereoscopic table" (Fig.

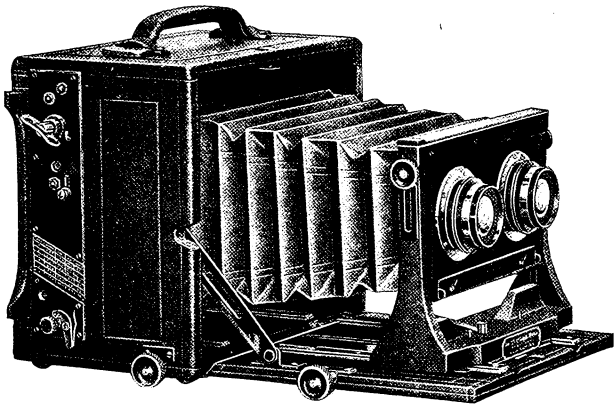


Fig. 324. Double lens camera for making stereophotographs.

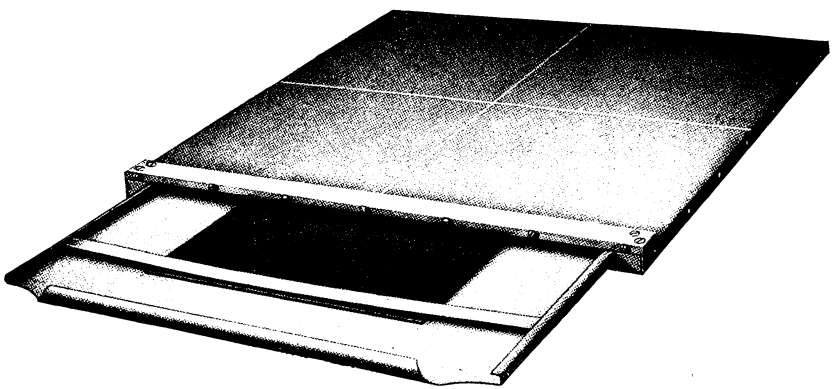


Fig. 325. Plate changer.

326), which latter is simply a large plate changer made into a table. The principle of all plate changers is the same. The part being radiographed rests undisturbed on a window of celluloid or thin aluminum, while the plates slide beneath in a tunnel.

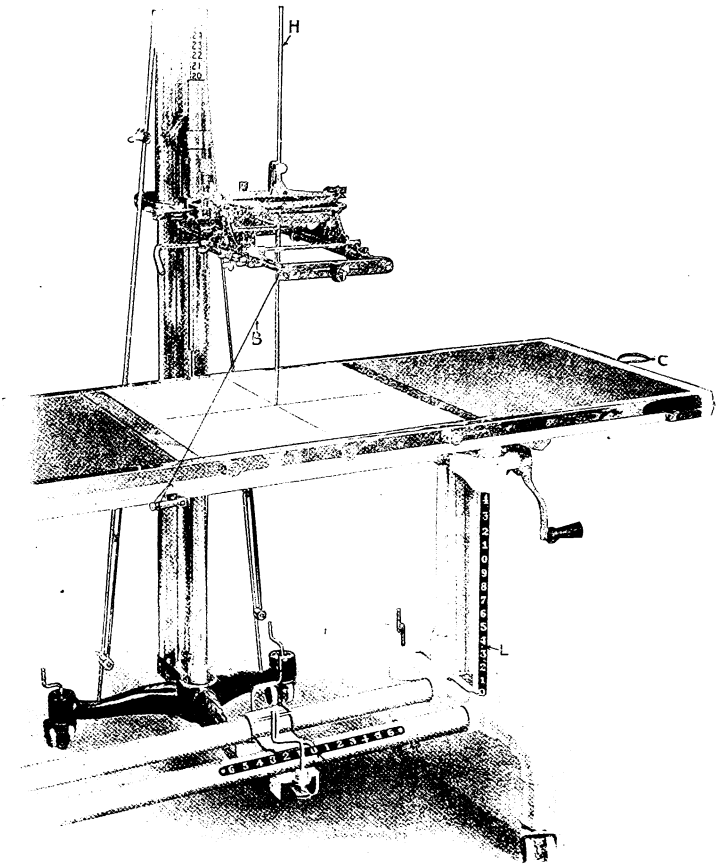


Fig. 326. Stereoscopic table and tube stand. H, centering rod.

The plate changer illustrated in Fig. 330, and explained by diagram in Fig. 327, differs from others in that only one five by seven inch plate is used, two pictures, five by three and one-half inches, being made on either end of the plate. A five by seven stereoradiograph (both pictures on the one plate) may be observed with a hand stereoscope (Fig. 322), while all other plate stereoradiographs must be observed with the special stereoscope (Fig. 323).

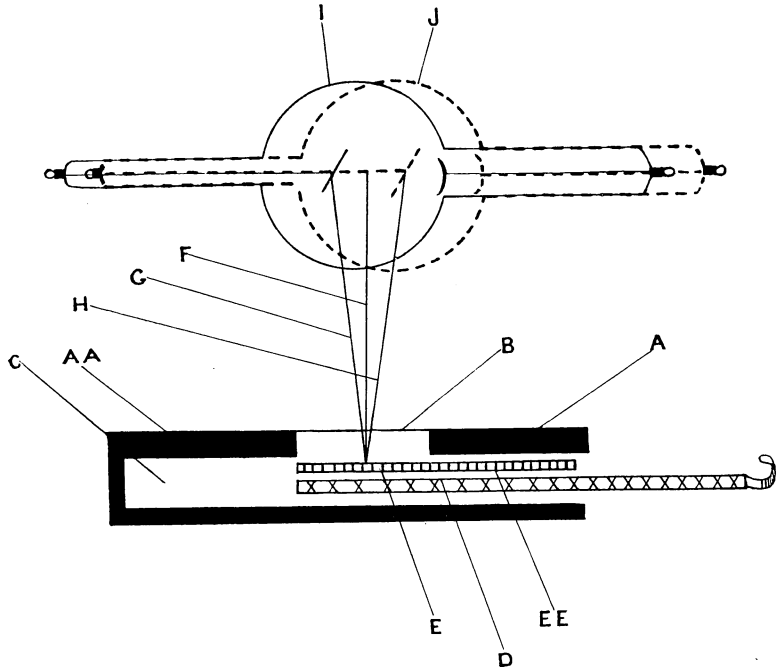


Fig. 327. A and AA, lead which protects the plate against the action of the X-ray. B, window of thin aluminum or celluloid on which the part being radiographed lies. C, end of the tunnel. D, plate carrier. E, end of 5x7 plate on which the first radiograph is made with the tube in position I. EE, end of plate on which second radiograph is made after it is shifted under the window B, and the tube is in position J. F, centering line. G, angle of X-rays with the tube in the first position, I. H, angle of X-rays with the tube in second position, J. The diagram shows the tube being shifted on a line with its long axis. It may be shifted in this manner, or at any angle to its long axis—it makes no difference.

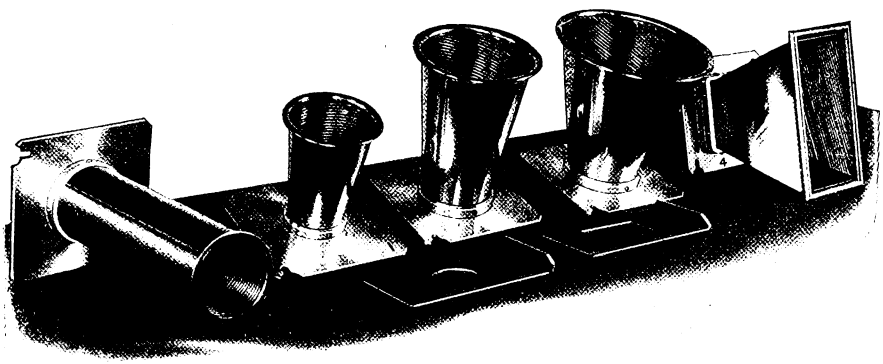


Fig. 328. Compression cones, cylinder and square.

Technic for Making Stereoradiographs.

Let us now take a concrete example and describe and discuss the steps taken in the making of Fig. 339.

Distance. First, what should be the distance between the target and the plate? There are no special rules to follow regulating the distance between the target and the plate when making stereoradiographs. The same results were obtained by the writer with the distance twelve inches as when working at twenty-four inches.

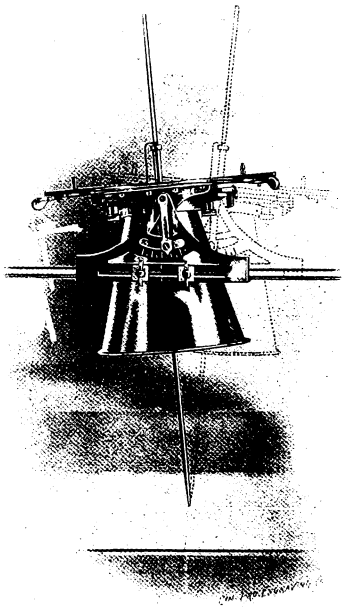


Fig. 329. The lead glass bowl and X-ray tube must be removed while the centering rod is being used. When the stand is "set," the rod is removed and the protection bowl and X-ray tube replaced.

Setting Tube Stand. The first step is to "centre the tube," to place it so that a line (line F of Fig. 327) drawn from the focal point on the target will strike the plate in the center. This may be done with the greatest accuracy by the use of the centering rod (Fig. 326), but the use of the rod is not imperative unless a compression cone or cylinder (Fig. 328) is to be used, as will be described presently.

After centering the tube, when using a stand like the one in Figs. 326 and 330, the stand is "set" so that the tube may be moved one and one-quarter inch on each side of the center to positions I and J of Fig. 327 (see illustration).

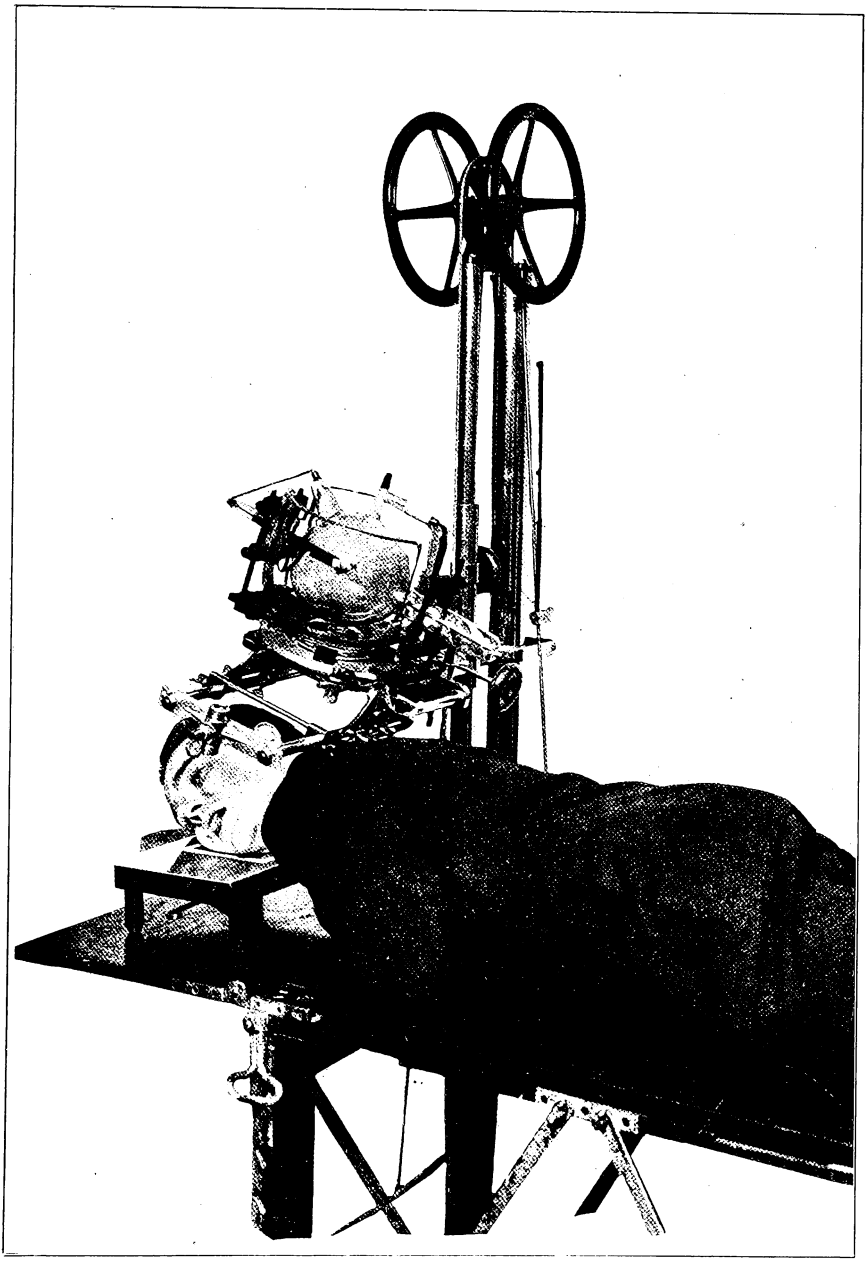


Fig. 330. Pose for making Fig. 344. It is often expedient to have the patient remove the coat and collar for this pose.

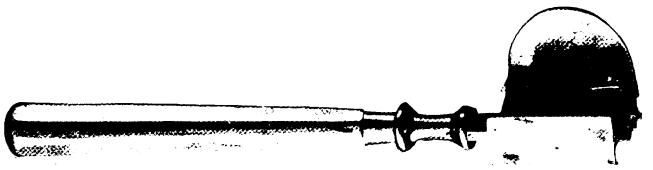


Fig. 331. Modified Kny-Sheerer film holder.

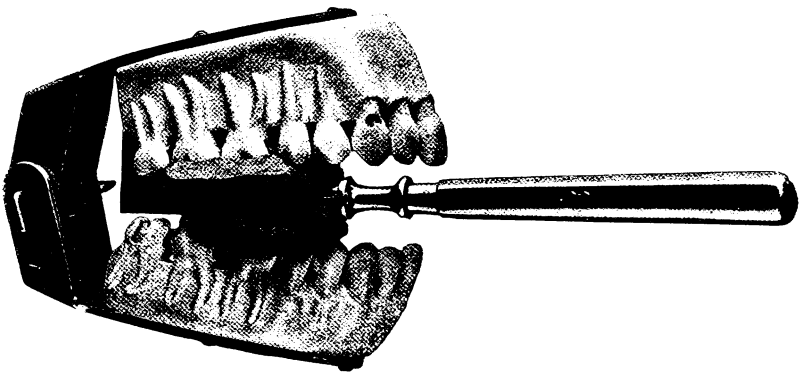


Fig. 332. The film holder shown in Fig. 331 in position.

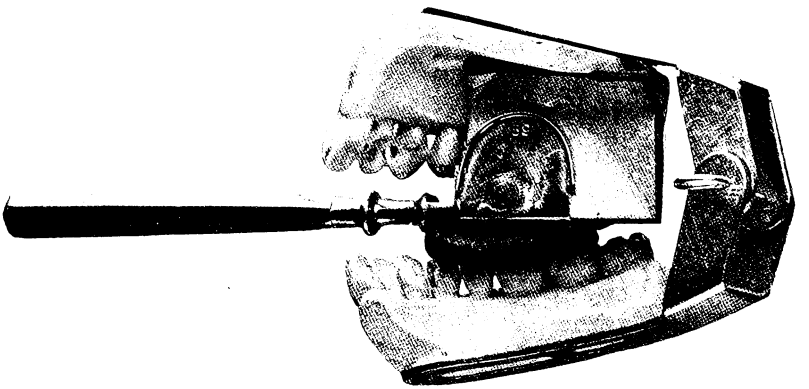


Fig. 333. Another view of the film holder in position.

Tipping the Tube.

It is not necessary to tip the tube, as it is shifted, in order to have the X-rays strike the object and plate at the proper angles—at the angles at which the eyes of an observer would see the object, because the X-rays emanate from the focal point on the target in diverging lines in all directions. So the *same* X-rays are not used to make the second picture that are used to make the first. If they were, it would be necessary to tip the tube to make them strike the object and the plate at the proper angles. (Observe lines G and H of Fig. 327.) When using a compres-

Fig. 334 Fig. 335 Fig. 336

Fig. 334. The photographic print from which this halftone was taken was made from the original negative, or "first picture."

Fig. 335. The same as Fig. 334, except made from "pictures one and two," held together with binding strips.

Fig. 336. The same field as Fig. 334, but made from the "third picture."

sion cone or cylinder we *do* use the same rays to make both radiographs, and hence it becomes necessary to tip the tube as it is shifted. This can be accomplished with accuracy only by the use of the centering rod (see Fig. 329). Thus, if a cone or cylinder is to be used, the tube stand must be "set" not only to shift the tube but to tip it also as it is shifted.

With the tube stand "set," the tube in position I of Fig. 327, and the plate in the position shown in Fig. 327, the first exposure is made. The tube is then shifted to position J, the plate carrier pushed in until the unexposed half of the plate comes under the window B, and the second exposure is made. Since the two radiographs are made on the same plate in this instance, special care should be taken to expose them each the same length of time. Otherwise they will "come up" unequally in the developing solution and radiographs of different densities will result.

If the technic outlined above is followed, it will be found when observing the finished stereoradiograph that we see the part from the position of the tube during exposure. Thus observe Fig. 339, which was taken with the palm of the hand toward the plate, a coin on the back of the hand, a needle under the hand.

If, instead of following the technic as given, the first exposure be made with the tube in position J and the plate as shown in Fig. 327, and the second exposure with the tube in position I, after the plate is shifted; then, when observing the finished stereoradiograph, it is as

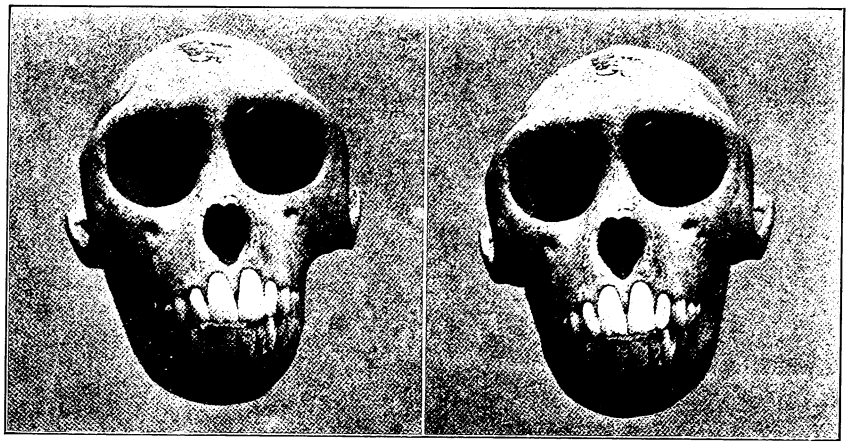


Fig. 337. Stereophotograph of the skull of a monkey, from Dr. John J. Kyle's collection of skulls of vertebrates.

though we saw the part from the position of the plate during its exposure (see Fig. 340).

This changing of position of observation may be accomplished also by interchanging the two radiographs—placing the right on the left and the left on the right. Take Fig. 339, for example; interchange the radiographs and the stereoradiograph is the same as Fig. 340; or take Fig. 340 and interchange the radiographs and the stereoradiograph is the same as Fig. 339. The interchanging of radiographs must be done without inverting them, or the change of position of observation will not be accomplished—the stereoscopic effect will remain the same and the part will simply be viewed upside down.

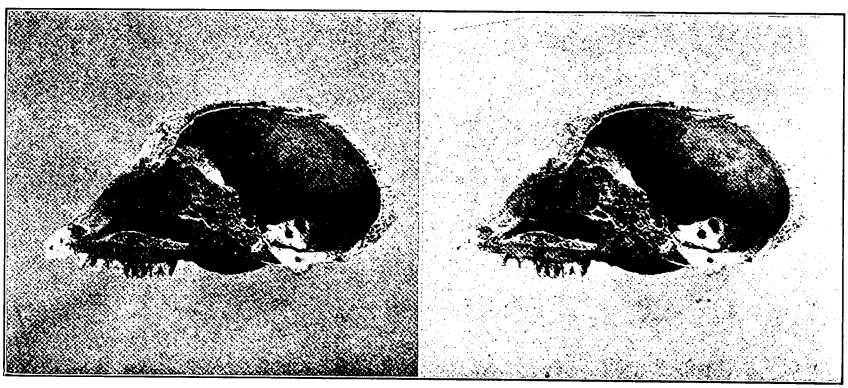


Fig. 338. Sagittal section of the skull of a monkey, from Dr. John J. Kyle's collection of skulls of vertebrates.

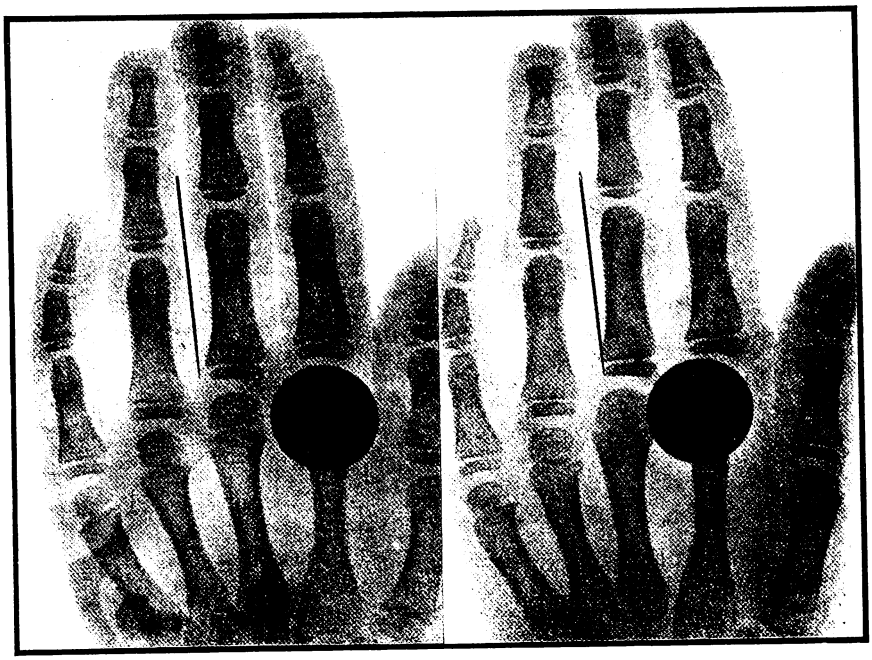


Fig. 339. Showing the coin on one side of the hand, the needle on the other. Here we observe the hand from the position of the tube.

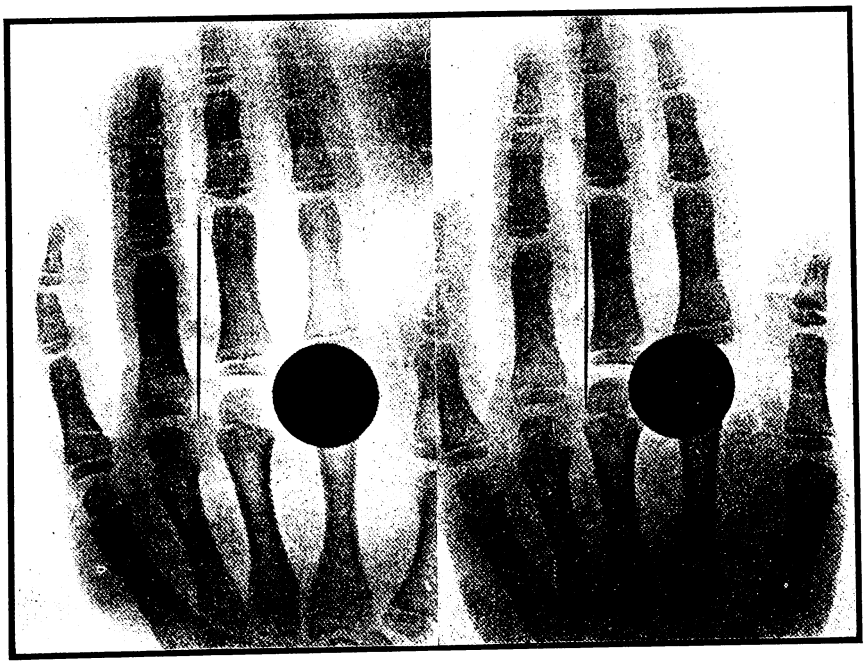


Fig. 340. The same as Fig. 339 except that we observe the hand from the position of the plate during its exposure, instead of the position of the X-ray tube.

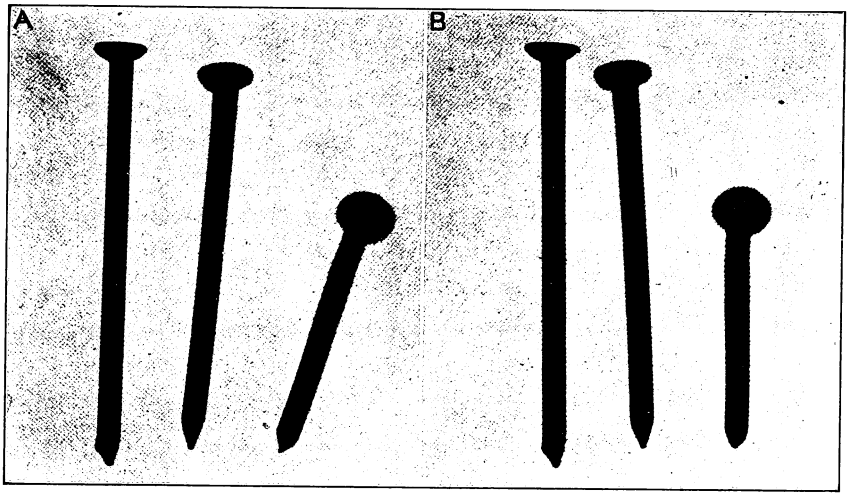


Fig. 341. Three nails of the same size and length. One is in a vertical position, the other two lean toward the observer, at different angles.

Figs. 341, 342 and 343 are the same radiographs mounted differently. No stereoscopic effect at all is seen in Fig. 343, because the tube was shifted at right angles to the long axis of the nails. Had the tube been shifted on a line with the long axis of the nails it would be necessary to observe them as in Fig. 343 to get a stereoscopic effect.

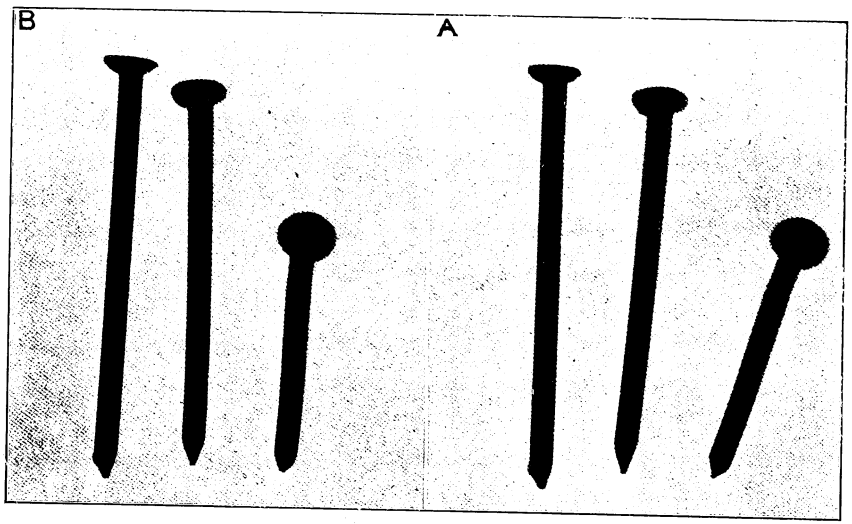


Fig. 342. The same as Fig. 341 except that the individual radiographs are interchanged, the right changed to the left side and the left to the right side. Thus in this stereoradiograph the leaning nails lean away from instead of toward the observer.

Special Technic for Dental Stereo-Radiography.

We now come to a more definite consideration of dental stereoscopic radiography. Stereoradiographs of the lower teeth may be made on plates using the plate changer illustrated in Fig. 327. Fig. 344 is such a stereoradiograph. Fig. 344 was made from the pose illustrated in Fig. 330.

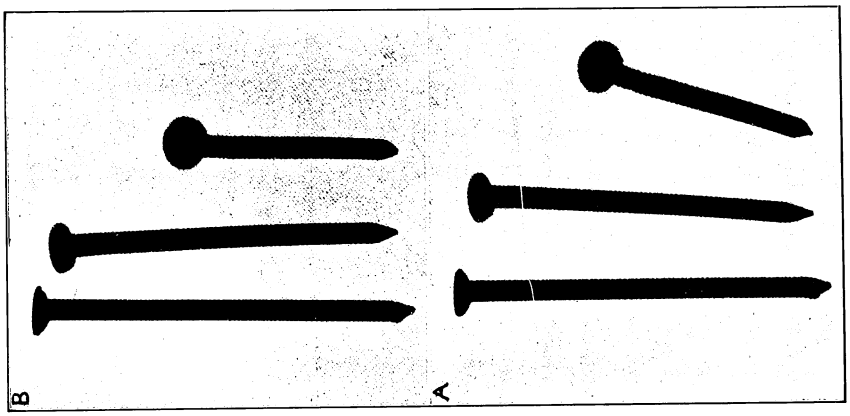


Fig. 343. No stereoscopic effect at all is obtained with the radiographs mounted as in this figure.

When making stereoradiographs on separate plates, like Figs. 345 and 346, it is necessary to use a large plate changer, like Figs. 325 and 326. Figs. 345 and 346 were made on eight by ten inch plates, and the radiographs reduced, as shown in the figures, so that they might be observed with the small hand stereoscope. To observe the original negatives it is necessary to use a large stereoscope (Fig. 323).

Dental Film Holder.

When making dental stereoradiographs, on films held in the mouth during their exposure, the problem of replacing the first film, after its exposure, with a second film, which will occupy precisely the same position as the first, is one fraught with great difficulties. In an effort to accomplish this the writer uses a Kny-Sheerer film holder and modeling composition. The film holder, as I use it, is modified almost beyond recognition (see Figs. 331, 332 and 333). Films may be placed in this modified holder in exactly the same position, and, by the aid of the impression of the occlusal surfaces of the teeth in modeling composition, the holder may be replaced in the mouth in the same position. This film holder is applicable to practically any part of the mouth, but especially so to the molar region.

It is not absolutely necessary, but I prefer to have the patients pose in a recumbent position for all dental stereoscopic work, believing they are less likely to move the head while the films are being changed in this position than they would be if sitting in a chair. Thus the pose for making Fig. 347 was a slight modification only of Fig. 330.

Thanks to the work of Dr. C. Edmund Kells, we now know that it is not necessary to have the two films in exactly the same *position* to make

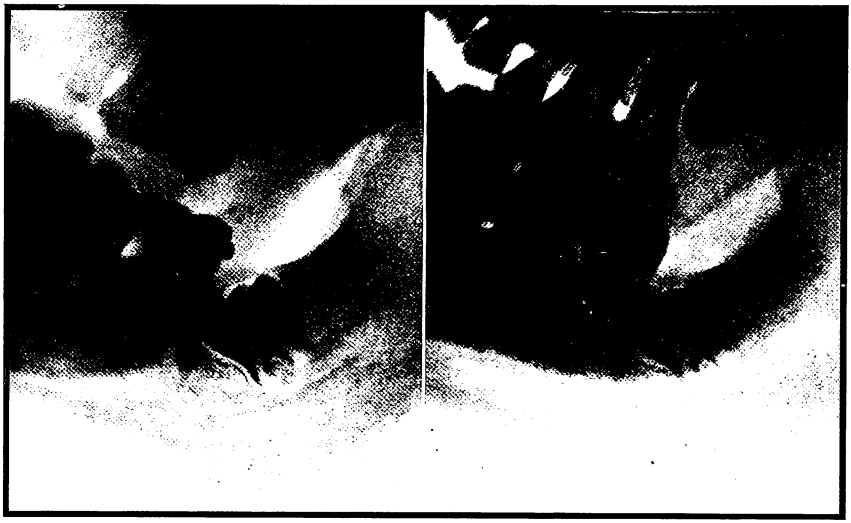


Fig. 344. Though the stereoscopic effect is not very good the figure is representative of what can be done by the method employed to make this stereoradiograph.

a stereoradiograph like Fig. 348. All that is necessary is to have them occupy exactly the same *plane*. Hence no film holder need be used. The film is placed in the mouth as in Figs. 88 and 89.

Preparation of Radiographs for Study with Stereoscope.

After the two film negatives are made, prints may be made from them, and these prints mounted on cardboard to be observed with the hand stereoscope. Or the negatives themselves may be observed stereoscopically by mounting them on transparent glass, sticking them in place with binding strips such as are used in *passé partout* work. It is Dr. Kells' practice to make radiographs from the original negatives on a photographic plate, just as one would make a lantern slide from the original negative, and use these (let us call them "prints on glass"*) for observation with the stereoscope. I do not see any ad-

*Transparencies.—Ed.

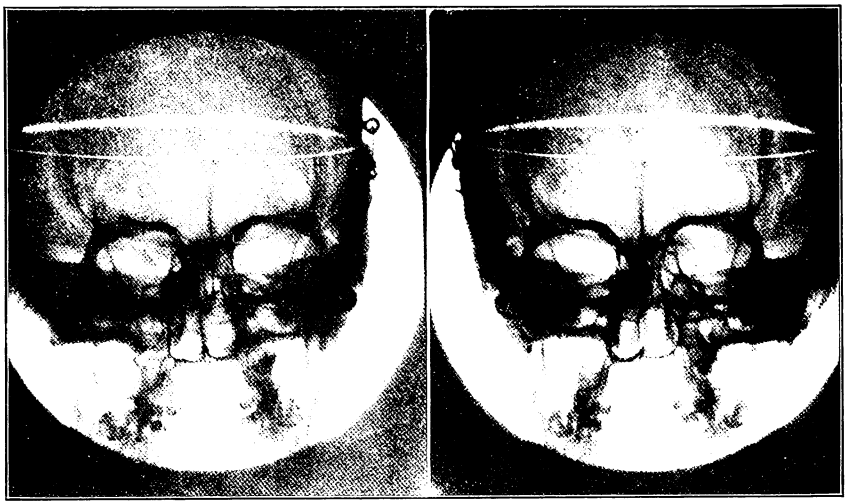


Fig. 345. Antero-posterior view of a dry skull. The right sphenoid sinus is filled with lead shot.

vantage in this over a study of the negative itself, and there is the disadvantage of additional work and possible loss of detail.

The distance between the radiographs mounted for stereoscopic observation should be approximately two and one-half inches from a given point in one radiograph to the same point in the other radiograph. Great accuracy in mounting the radiographs for stereoscopic study is not necessary though preferable.

Landmarks. It is always expedient when making dental stereoradiographs to place some landmark, such as an anchor clamp band or a wire, on the teeth. Knowing then that the screw and nut of the clamp band are on the lingual or

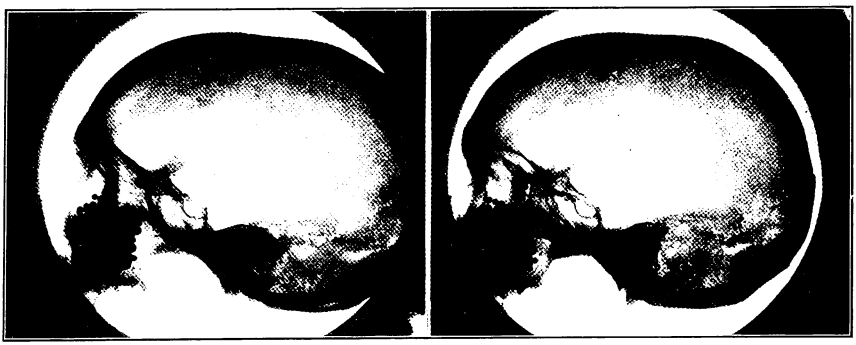


Fig. 346. The reproduction here has lost much of its excellence. When the original negatives were viewed in the illuminating stereoscope, one could look as clearly and directly into the skull as he could into a soap bubble. The dark outline is the antrum nearer the observer filled with lead shot. (Stereoradiograph by A. M. Cole and Raper.)

buccal side, as the case may be, or that the wire is twisted on the lingual or labial side, as the case might be, we may determine immediately, when observing the stereoradiograph, whether we observe the part from the position of the tube or the position of the film.

Dr. Kells states that, as a general proposition, a more perfect stereoscopic effect may be gained if the radiographs are mounted so that the

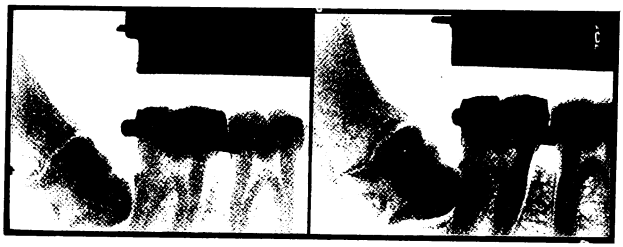


Fig. 347. Impacted lower, left, third molar, viewed from the lingual. The screw and nut of the clamp band are on the lingual.

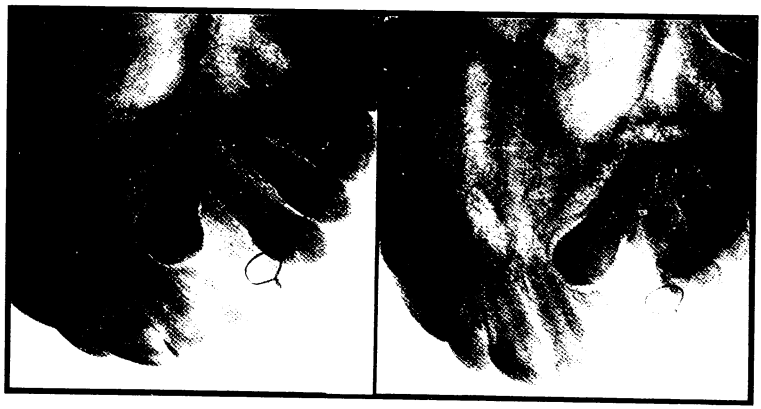


Fig. 348. Viewed from the position of the film—from the lingual. The temporary cuspid is so much decayed and resorbed it can scarcely be seen. The wire around its neck can be seen clearly. The wire is twisted on the labial.

stereoradiograph is observed from the position of the film. This is true, and one reason for it is that, other things being equal, the closer an object is to the plate or film the clearer it is outlined in the radiograph. Likewise as we look upon a scene, the closer objects are clearer than those at a distance. Hence, when we observe a stereoradiograph from the position of the film or plate during its exposure, those parts of the stereoradiograph seeming to be closer to us are clearer, while those farther away are less clear.

If the film packets used contain two films each, four negatives will be made, and these may be mounted on clear glass, so that the operator may observe the part from the position of the film and tube also.

Enlargement of Dental Stereoradiographs.

In direct proportion as things are large or small it is easy or difficult to discern perspective. The parts in dental radiographs are so small that it is difficult to gain perspective. In an effort to overcome this handicap, to an extent at least, Fig. 350 was made. Fig. 350 is an enlargement of Fig. 349. Owing to the loss of

Fig. 349. Impacted upper, third molar, viewed from the position of the tube. The wire passing around the neck of the second molar is twisted on the lingual. The impacted tooth sets to the buccal.

Fig. 350. Same as Fig. 349 enlarged.

detail incident to enlargment there seems little if any advantage in this step. There is none made at the present time, but a magnifying stereoscope would probably be of value for viewing dental stereoradiographs.

Practical Value of Dental Stereoradiographs.

So much for the technic involved in the practice of dental stereoscopic radiography. Let us now consider the results, the practical application and the possibilities of dental stereoscopic radiography. Frankly, the results are discouraging. Considering

the difficulties of practice, and the results obtained at the present time, there is an extremely limited practical application of the stereoradiograph to dentistry. What the future possibilities of dental stereoscopic radiography are I would not attempt to say. My hope is that some day we may be able to stereoradiograph the upper molar roots successfully.

By describing it I think I have proven that the technic involved to do dental stereoscopic work is so difficult that the work should be left entirely to specialits in radiography. Even in the hands of the most skillful it seems, at the present time, that there are several good reasons why it will never be popular. The reasons are: (1) The difficulty, and

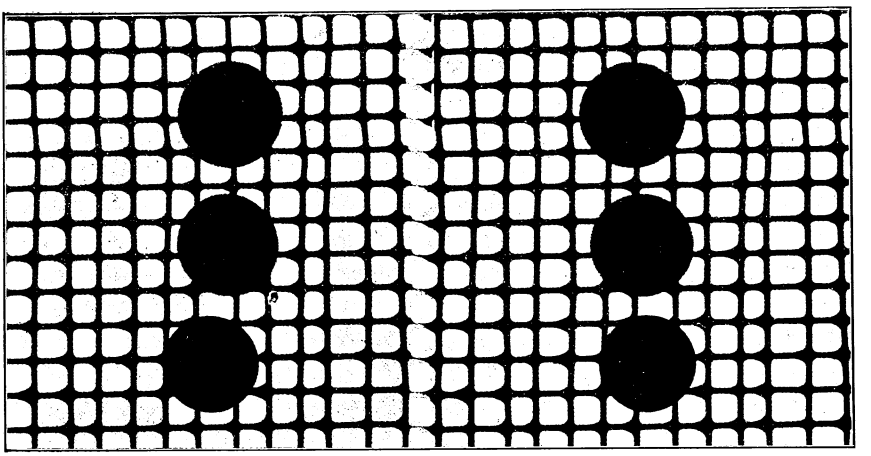


Fig. 351. Coins at different distances from a wire screen.

at the same time the necessity, of obtaining two radiographs uniformly rich in detail. (2) The difficulty and necessity of placing two films in the mouth in the same position. (3) The difficulty and necessity of having the patient maintain the same pose while the two exposures are made. (4) The great amount of time consumed to do the work. (5) The parts being so small makes it especially difficult to gain a stereoscopic—a perspective—effect. (6) One of the most important reasons why dental stereoscopic work probably never will be popular, even among specialists, is that we feel no great need of it. The single radiograph is not totally lacking in perspective, and a careful study of it will reveal almost, if not quite, as much as can be seen in the dental stereoradiograph. (7) The stereoradiograph is sometimes misleading. For example, witness Fig. 351. To make this illustration three coins were placed on a piece of wire screening, one directly against the screen, the other two resting on cotton

built up to hold them at different distances from the screen. In the stereoradiograph the coin which rests against the screen seems to stand out from it a short distance.

Some day perhaps we may so modify and perfect our technic that the stereoradiograph will be of indispensable value (1) in observing the three roots of upper molars; (2) in seeing a wire passing through a perforation to the labial, buccal or lingual; (3) in some particular cases

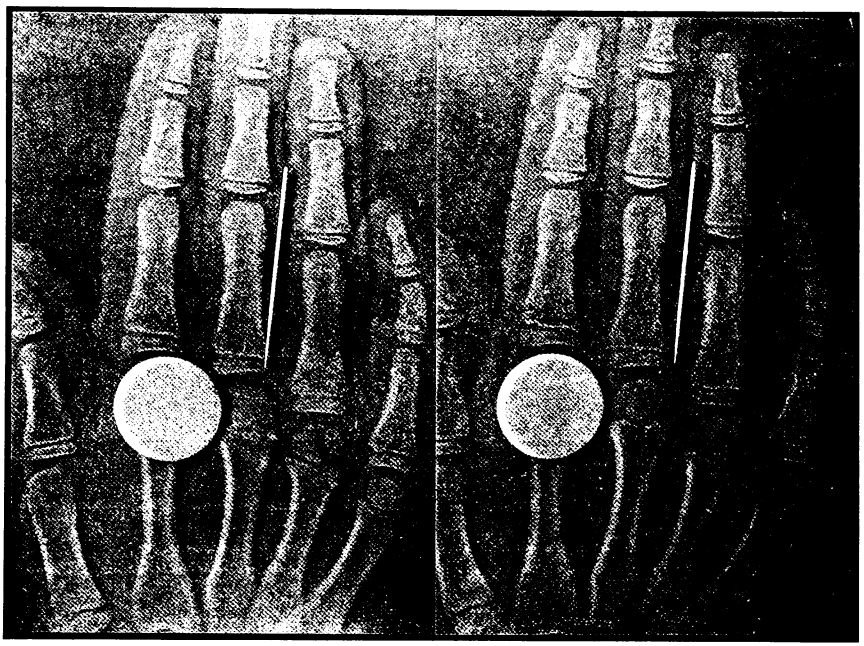


Fig. 352. Same as Fig. 339 made "plastic."

of impacted teeth to show more exactly their location, and so aid in the extraction; (4) in showing the orthodontist when he may move the coming permanent teeth by moving the deciduous teeth; (5) in determining more exactly than can be done with the single radiograph the size and location of a pus cavity or cyst; (6) in cases of fracture of the mandible; (7) in locating exactly bone "whorls," calculi in the glands or ducts of glands and foreign bodies in the antrum; (8) in learning the size, shape and location of the antrum as an aid in opening into it; and (9) in cases of tumor to locate more definitely the offending body.

Plastic Radiography.

There is no one thing which so limits the usefulness of the radiograph as its lack of good perspective. Hence our interest in stereoscopic radiography. Hence, also, our interest in plastic radiography.

Plastic radiography is a method of making radiographs in such a way that the parts stand out in *bas relief*. A better name than plastic

Fig. 353. Plastic reproduction of Fig. 347.

Fig. 354. Fig. 353 enlarged.

radiography would have been trick radiography. I describe the method simply as a matter of interest. It is of no practical value whatever.

Technic of Plastic Radiography.

The following are the steps in making a plastic radiograph. The negative is made as usual. For convenience in referring to it we shall call the negative the *first picture*. From the *first picture* another picture, the *second picture*, is made on a photographic plate, the technic for doing this being the same as for making lantern slides (see Chap. V). The *first* and *second pictures* are now placed together, non-sensitive sides in opposition, held up to the light and moved about until the parts of the two pictures overlie one another exactly. They are now held immovable while an assistant sticks them together with

paper binding strips. Next, place them in a printing frame and make a photographic print on paper (see Figs. 335, 352, 353 and 354). While the exposure is being made the printing frame must remain immobile and the light must pass through pictures number one and number two and strike the photographic paper at an angle of about ninety degrees.

Instead of allowing the light to pass through pictures one and two and strike the photographic paper at an angle, the same result may be accomplished by allowing the light to pass straight through pictures one and two, if at the time they are stuck together the two pictures are almost, but not quite, in perfect overlying opposition.

Instead of making the print on paper from pictures one and two, another picture, number three, may be made on a plate, and from this *third picture* photographic prints made (Fig. 336).

Plastic radiography is simply a scheme of shading radiographs. Nothing *more* can possibly be seen in the plastic production than could have been seen in the original negative, though, perhaps, something may be seen *more easily*. To the man unacquainted with the reading of radiographs the plastic pictures seem much clearer, but to the man of experience it is not so clear, for there is an unavoidable loss of detail in the making of the plastic reproduction.

Plastic Stereoradiographs.

Figs. 352, 353 and 354 are plastic stereoradiographs. It is interesting to pause and consider the number of steps necessary to make Fig. 354. First, the negatives were made; from these the "second picture" of the plastic method, then the prints on photographic paper, from which enlargements were made, and then the halftone.

In concluding let me say that the properly made, intelligently read single radiographic negative is of the utmost importance and value in the practice of dentistry. Let us not forget this, and let us not decry the radiograph because our efforts in stereoscopic and plastic work fail to make it absolutely infallible.

The Development of the Maxillæ with Reference to Opening the Median Suture.

By Martin Dewey, Kansas City, Mo.

Lecture before the American Society of Orthodontists, Chicago, July, 1912.

In giving this lecture, the greatest trouble which I have had is in limiting myself to those phases of the question which have a direct bearing on the subject. There are so many things that enter into the question of the development of the maxillæ with reference to the opening of the suture that I was forced to sort my slides even after I reached Chicago, so as to be able to limit my talk to the time allotted.

Some of the members yesterday insisted upon discussing my paper before it was read, for which I was truly thankful, as I now know I was right in considering some of the men's opinions which I took into consideration while doing this work.

If you will review the dental literature on the subject of "opening the median suture" with reference to increasing the width of the dental arch and increasing the nasal space, you will find a great many different opinions advocated as to the value of that line of treatment. A great many men have described cases in which they claim that the clinical results which they have obtained could be explained only by the opening of the suture between the premaxillæ and maxillæ. I do not know who was first to advocate this plan of treatment, but it has been advocated

quite often in the last ten years; and all have claimed great advantages for this method over the gradual expansion of the dental arch. The papers which have recently been published under the authorship of Dr. Pullen, of Buffalo, and Dr. Hawley, of Washington, may be taken as papers which have reviewed the questions of the opening of the suture quite thoroughly, and you would suppose from reading their papers that they were in favor of the operation. On the other side we have the statements from Dr. Cryer, of Philadelphia, and Dr. Federspeil, of Milwaukee, who do not think the opening of the median suture possible. Again, we have the opinion of men like my friend Dr. Brady, of Kansas City, who thinks he has opened the median suture in two cases, and who nevertheless condemns the operation as one that is unscientific and not conducive to the best results.

Evidence in Favor of Opening Median Suture.

With these different views in mind, I would say that all of the evidence that I have seen presented in favor of opening the median suture has been of a clinical character. I am aware that papers have been presented before this society at various times advocating the opening of the suture; ingenious appliances have been proposed and described; models have been shown of the cases before and after treatment, along with radiographs intended to prove that the suture had been opened. The benefits to the patients have been described and many advantages outlined for that plan of treatment, but as Dr. Brady has said: "No evidence has been given that would cause us to believe that better results, or results as good, could not have been obtained by a different plan of treatment, one which would have produced a gradual expansion of the arches." Clinical evidence is the principal evidence that we have in favor of the opening of the suture, and I am one who believes that there is no class of evidence that is so faulty or open to so many grave errors. Men who have reported the cases of "opening of the suture" have always been in favor of the operation; they have only seen certain things happen and have not looked for any other explanation of the results presenting, while there might have been a more logical explanation of the results as shown by the models and radiographs. As an example of the faulty views that may be adopted by taking into consideration only clinical evidence, I have only to refer you back a few years, when the entire medical profession thought tuberculosis an inherited disease. Did we not see one person after another in the same family contract the disease? Did we not see children of mothers who were tuberculous develop the disease? Generation after generation were doomed to die because, as the world thought at that time, the disease, being inherited, there was no hope for the offspring. At a later date I refer you

to syphilis. Congenital syphilis was one of the diseases that had a firm hold in the minds of those who based their knowledge on clinical evidence, and it was but recently that scientific investigation proved the disease to be the result of a germ. I simply mention this to show you the weakness of clinical evidence when unsupported by other facts.

The Author's Opinion.

My opinion in regard to the opening of the intermaxillary, premaxillary, median suture, or whatever you may call it, is probably between the two extremes. I am not ready to say that the median suture or the sutures between the two halves of the maxillæ cannot be opened; neither do I believe that it is the proper thing to do. In beginning my work upon this subject I was inclined to ask myself the following questions: What evidence have you that you can or cannot open the median suture? If you can open it, what would you gain and what harm might you produce? Would there be any danger in spreading the halves of the maxillæ, which would amount to practically spreading the halves of the face? What is to become of the bones and cartilages which form the septum of the nose? What will the vomer do? Will it project down in space between the halves of the maxillæ, as has been suggested by some? Also, what will happen to the connective tissue which lies between or binds the two halves of the maxillæ together?

After you have taken these things into consideration you should enlighten yourself by a study of the anatomy of the parts, and should make your studies not only on the dry specimens, but also upon fresh specimens. Some of the conditions which have been shown as representing the opening of the median suture have been found in skulls in which no attempt has ever been made to open the suture. These conditions have been found both in radiographs and in anatomical examinations.

I think some men have made the statement that the suture is a known region of bone development. Dr. Jackson, in a paper read before the National Dental Association at Denver, laid great stress upon the growth of bone from the region of the suture, which would lead you to think that probably the greatest amount of bone was developed in the immediate neighborhood of the suture. What evidence have we that bone develops any more rapidly in the suture than it does anywhere else?

Some have advocated that an increase of the breathing space could be obtained by opening the median suture, thereby increasing the width of the nose. I cannot see that any great benefit could result in the breathing of the patient, for the greatest width and the increase of space would be obtained in the inferior meatus, which meatus is not necessary to the proper breathing of man.

There are some of the lower animals in which the skull always

presents an open median suture, and we do not find a wide nasal space, but one that is comparatively narrower than in those animals in which the median suture is closed. Therefore, if those animals which have an open suture possess narrow nasal cavities and narrow dental arches, we cannot draw any conclusions from that phase of comparative dental anatomy that would suggest that an open suture would be of any benefit to man. (Figs. 1 and 2.)

Fig. 1. Showing narrow dental arch and wide breaking space. Open suture and narrow dental arch.—Rabbit.

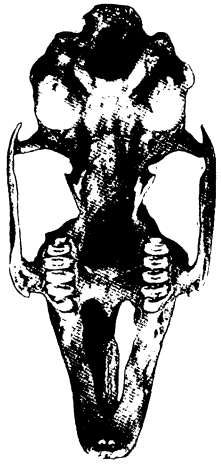


Fig. 2. Showing open median suture between the maxillæ and distal portion of the premaxillæ.—Rabbit—occlusal view.

In studying this question, you should take into consideration the evolution and development of the parts; note the different jaw forms which we find in the lower animals, also the relation of the jaws to the open or closed condition of the suture and the development of the parts as associated with the suture. In studying the development of the jaws we should notice the development of the suture and the bones in the median line. Take into consideration the development of the bones of the face as well as the development of the oral cavity. You must consider that at one time the oral cavity occupied the whole of the lower part of the face, and that the nose is only the second story to the mouth. Also the development of the premaxillary bones must be considered, and the origin of the same as compared to the rest of the upper tooth-bearing bones. The intimate relation which exists between the nasal and oral cavity compels us to admit that anything that causes very much change in the oral cavity will produce some change in the nasal cavity.

The Vomer.

You must bear in mind the evolution of the vomer; the relation of the vomer to the rest of the bones of the mouth and nasal cavity. The vomer was originally a tooth-bearing bone which projected down between the maxillæ and palate (see Fig. 2). It develops from a downward growth from the frontonasal process, and is not formed from the first branchial arch, as is the maxillæ. In man the vomer occupied a space in the nasal cavity, but is supported by a rostum of bone which develops for that purpose (Fig. 6). If you open the median suture you must of necessity do something to the vomer which is attached to the maxillæ in the region of the suture. What do you do?

Would Opening Suture be Advantageous?

Another phase of the question is, What are you going to gain by the opening of the suture? I have mentioned the fact that in the lower animals an open suture does not necessarily mean a wide nasal cavity nor a wide dental arch. I have also stated that the inferior meatus is not necessary to the breathing of man, for you can pack the inferior meatus full of cotton and the normal individual will breath as well as ever. Also I might state that a great many physicians think if the inferior meatus is open the child should breathe through the nose; so they state that there is nothing the matter with the child because they fail to find obstruction in the lower meatus. Therefore, the increased space in the nasal cavity that you would get would not be in position that would do you much good.

Why is the advocated opening of the median suture more of an advantage than the gradual expansion of the dental arch, which will cause a development of the nasal cavity and give us the breathing space where we need it, which has been proven time and time again to be true? Yet we have men like Drs. Hawley and Barnes tell us that they obtain results by the so-called opening of the suture that they could not obtain any other way. We must accept their statement as at least expressing their opinions, and they should be heard. However, it is possible that they have failed to open the suture, but by the application of force in attempting one thing have produced another which is equally good.

Bone Development.

I called your attention to the statement of some men that the suture was a known region of bone development. So far as I know, no evidence has been presented that would tend to prove that bone develops with any greater rapidity in the region of the suture than elsewhere. I mean that the increased width of the dental arch from the child to the adult is not the result of the increase of bone that forms in the region

of the suture, but is the formation of subperiosteal bone over the whole of the maxillæ and nasal bones. In order to settle this question, or at least throw some light on it, we will have to take up the embryonic development of bone and also the development of bone in the adult, and notice the difference between the endocartilage development, intramembranous and subperiosteal bone. All bone grows by subperiosteal development except

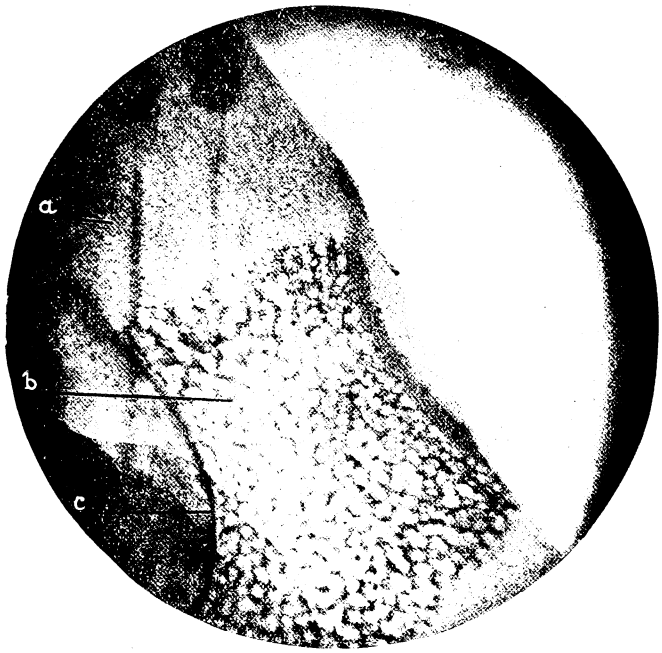


Fig. 3. Section of endochondral bone development from base of skull. (*a*) Cartilage cells arranged in rows. (*b*) Calcified cartilage matrix not true bone. (*c*) Periosteum formed from perichondrium which will form subperiosteal bone.

those that have been provided with an epiphyseal cartilage. Also the epiphyseal cartilage provides only for an increase in the length of the bone, while the diameter of the bone is increased by the subperiosteal growth. So then the development of the bones of the face is one of subperiosteal growth, as there is no epiphyseal cartilage between the halves of the maxillæ.

In order to determine if the bone develops under natural conditions any more rapidly in the region of the suture than elsewhere, I have made a number of studies in human and comparative embryos and in adult skulls. I have found nothing that would lead me to believe that there

is any greater growth in the region of the suture than there is anywhere else in the region of the periosteum. In order to thoroughly understand the different appearances of bone, I call your attention to a number of microphotographs which show different kinds of bone development and the region from which they have been taken.

The final solution of the question of the possible advantages to be derived from the opening of the median suture seems to me to depend

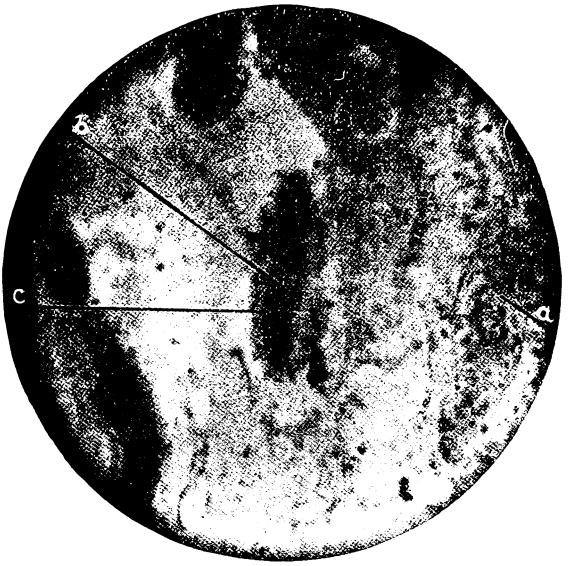


Fig. 4. (*a*) Embryonic osteoblasts forming an area of bone development. (*b*) Island of intramembranous bone. (*c*) Osteoblasts around island of bone.

upon the question of bone development. If by opening the median suture we get a development of bone which we cannot get in any other way, then by all means the operation is one that should be done. In order to justify the operation, or rather the plan of treatment, it has been suggested by men who favor that plan of treatment that the bone develops more rapidly in the region of the suture than anywhere else. Now, in order to understand the development of bone I will have to take you through the different phases of bone development. Therefore I will review first briefly the development of endochondral bone, or that bone which is primarily laid down in cartilage.

Endochondral Bone.

It is very probable that endochondral bone development is the primary bone development from the standpoint of evolution, because, if you remember, there are cartilaginous fishes in which the skeleton

never reaches the "bony" state, but remains as cartilage. There are a number of the bones in the skeleton of man that are first laid down in cartilage and then later formed into bone by the endochondral process. Briefly, the first phase to the formation of bone is the development of cartilage from the mesoderm, very much in the nature of hyaline cartilage. Then the cartilage cells undergo a rapid change, the nucleoli seem to de-

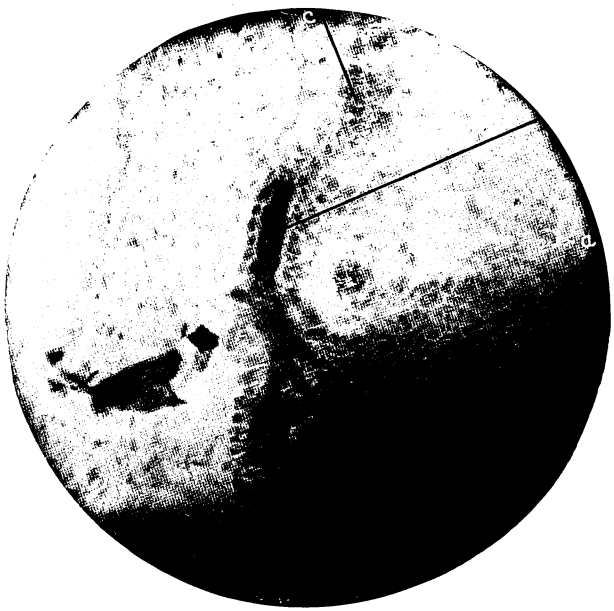


Fig. 5. Area on the buccal side of maxillæ. (*a*) Mass of osteoblasts showing that bone development is proceeding outward. (*b*) Spiculæ of intramembranous bone projecting buccally. (*c*) Osteoblasts collected so as to continue formation of bone outward.

generate and arrange themselves in rows and the intercellular substance becomes calcified (Fig. 3). This gives us a calcified cartilage matrix upon which the bone proper is formed. The next step is an inward growth of a blood vessel from the perichondrium, which carries with it a number of embryonic cells which are divided into two classes; some of them have the power to absorb the calcified cartilage matrix and are therefore called the osteoclasts, and others build bone and are called osteoblasts. Osteoclasts absorb a part of the calcified cartilage matrix, and upon the remaining calcified cartilage matrix is deposited the true bone by the osteoblasts, which form the primary Haversian systems. The space between the primary Haversian systems is filled by the calcified cartilage matrix, or, more correctly, the first Haversian systems were

formed upon this cartilage which was calcified. On the outside of this bone we have the perichondrium changed to the periosteum, and as soon as the formation of bone begins on the cartilage matrix the increase in diameter of the original cartilage matrix is provided for by the formation of bone by the periosteum, which bone is known as subperiosteal bone. The changes which take place in the cartilage during the process of the calcification of the cartilage, the appearance of the newly formed Haver-

Fig. 6. Section through pig embryo showing formation of maxillæ and vomer. (*a*) Intramembranous bone formation on lingual side of tooth. (*b*) Tooth germ. (*c*) Cartilaginous vomer which does not calcify. (*d*) Mesodermic tissue in which intramembranous bone formation is taking place, forming one-half of vomer. (*e*) Intramembranous bone developed from premaxillary bud to support vomer. There is no evidence of endochondral bone formation in the cartilage of the vomer.

sian systems, with the calcified cartilage matrix between the Haversian systems, make a picture which one can easily recognize in any field under the microscope. This picture is so noticeable and so characteristic that if you once see it you will never mistake it for any other form of bone development. Neither will you mistake any other bone development for endochondral bone development.

Now if we had a cartilage, something like the epiphyseal cartilage, between the two halves of the maxillæ in the region of the suture, we might expect to get bone development, or a continued bone development

in that region, but we have no cartilage in this location; neither do we find any place in the maxillæ that shows that the development of the maxillæ takes place by the endochondral process, so that leaves us without any hope of getting from the plan of opening the suture a growth of bone in the region of the suture such as we have in the location of the epiphyseal cartilages.

Intramembranous Bone Development.

The next form of bone development that must be considered is the intramembranous form, which to me is a much simpler process. Intramembranous bone formation, as the name implies, is that process

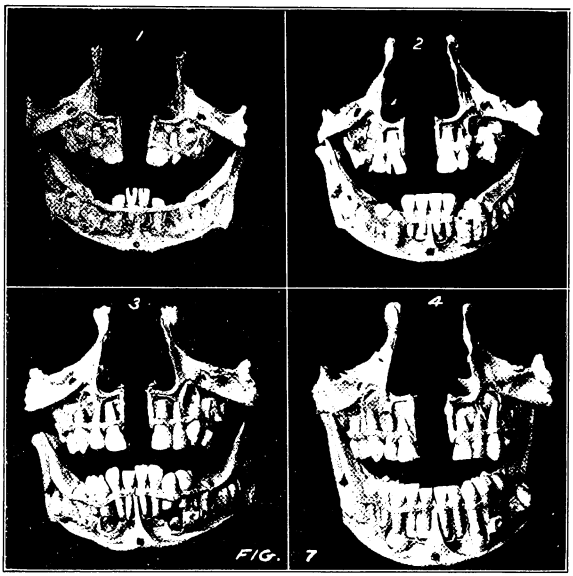


Fig. 7. (1) About nine months. (2) About one year. (3) About two years. (4) About four years.

where the bone is laid down directly within the connective tissue, that is, in the embryonic connective tissue, or, more correctly, within the mesodermic tissue. We have the maxillæ formed from the maxillary bud of the first branchial arch, and the maxillary portion of the first branchial arch develops wholly as a connective-tissue bud. In the mandible we have Meckel's cartilage, but no part of Meckel's cartilage is ever formed into bone within the region of the mandible. The first thing we notice in the formation of intramembranous bone is a collection of cells (Fig. 4, a), which are large and round, and which can be very easily recognized from the surrounding cells in the immediate field.

The next thing will be the formation of an island of bone (Fig. 4, b), which has been formed by those round cells which are osteoblasts. This island of bone proceeds to increase in size probably in one direction more than it does in the other. However, some area of ossification or islands of bone will seem to increase in one direction and the approximating one

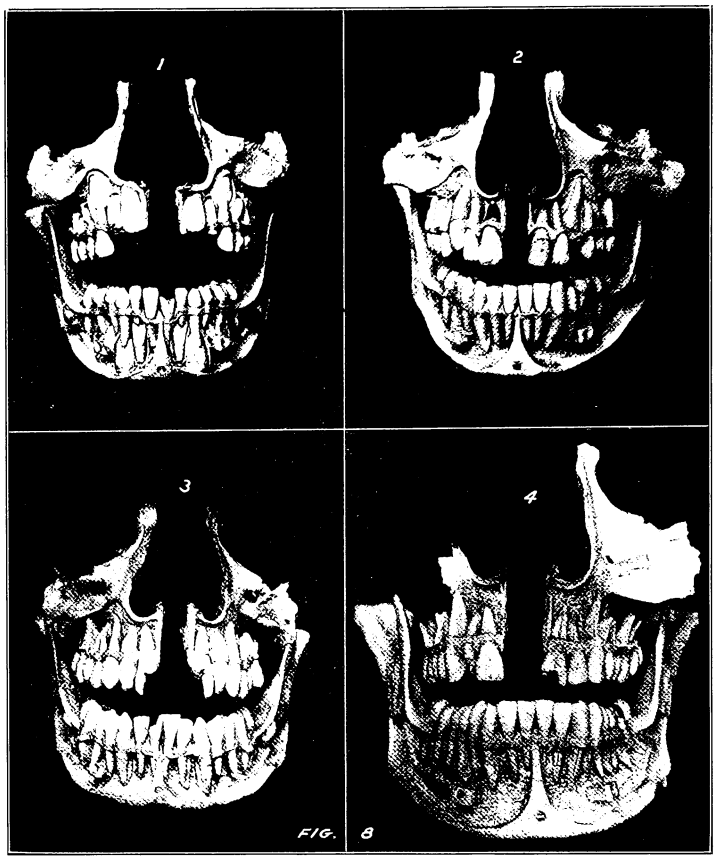


Fig. 8. (1) The seventh year. (2) The eleventh year. (3) The fourteenth year. (4) Adult.

will increase in some other direction, making a number of these bony processes, which may be spoken of as centers of ossification. In the formation of these spiculæ of bone (Fig. 5) they present an appearance very much like the formation of ice spiculæ when water begins to freeze in a bucket. These spiculæ of bone continue to multiply and increase in size until eventually they unite with one another, leaving primary marrow spaces between them, which, of course, are filled up with a substance very

similar to the marrow found in the marrow cavity of long bones. These spaces between the bone spiculæ are filled with the remains of the embryonic tissue out of which the bone was formed, and, of course, contains a great number of osteoblasts and osteoclasts. It is always possible for those cells to begin activity and develop bone anywhere within that particular region. Wherever you have embryonic cells that are capable of developing into osteoblasts or osteoclasts, bone development may take place, either by the building of new bone or by the absorption of bone

Fig. 9. Side view of skulls showing the relation of the developing teeth to the growth of the bone. (1) The seventh year. (2) The tenth year.

already built and the laying down of other spiculæ. All that is necessary is to provide the proper stimulation. After you have an area of ossification proceeding to a certain size you will notice the formation of a connective tissue on the surface of the bone, which is the periosteum. The rapid growth of bone which causes the increase in size of the bones of the face is the result of the activity of the osteoblasts within the osteogenetic layer of the periosteum. But you must not forget that there are osteoblasts all through the bone, within the marrow spaces of the bone, which under proper stimulation will develop bone, and also osteoclasts which under proper stimulation will cause the absorption of bone; so you have throughout the entire body of intramembranous bone and on the outside of it osteoblasts which are able to develop bone, and there is no need for us to look to the suture as the "known region of bone development," or to hope that our salvation in the expansion of arches lies in the opening of the suture to produce bone growth in that particular region.

The development of the jaws and face can be understood only by taking into consideration the intramembranous formation of bone. The microphotographs which I have shown you give the gradual development of the spiculæ of bone, then the increase in size of the areas of ossification by the addition of bone on the outside of the bone already formed;

Fig. 10. (*a*) Embryonic tissue from which the peridental membrane will be found. (*b*) Bone found by subperidental development.

and we see that the osteoblasts always collect upon the side of the bone toward which there is the greatest growth. If you will consider the change of facial outline from a child to that of an adult (Figs. 7, 8 and 9, from Dr. F. B. Noyes' collection) you will see that the only possible way in which the maxillæ could be formed would be by subperiosteal development. There is no possible development that could take place in the region of the suture that would change the face of a child to that of an adult. Take the mandible of a child and that of an adult; there is no way in which the growth could be brought about except by the development of bone on the labial sides and the absorption of bone on the lingual side.

In a section made from the developing alveolar process around a deciduous molar, we find that the bone is developing on the labial side of the labial plate, and on the lingual side of the labial plate the osteoclasts

of the peridental membrane are producing an absorption. As the tooth is erupting it is being carried outward by the growth of the bone, which is also producing a greater width of the maxillæ and nasal space (Fig. 10). You will find the bone more dense on the side toward which the greater activity of bone development is occurring, while on the lingual side you find the bone absorbed to such an extent that there are large medullary spaces. Also canals are seen running through the bone, which canals carry blood vessels and embryonic cells. It is by the subperiosteal development of bone that the maxillæ and mandible increase in size and change shape. There is no possible way by which the face of a child of nine months could be developed into that of an adult by the development of bone in the region of the suture. The entire change from a child to an adult is the result of bone development as I have described it, and this development is produced by the stimulating influences which nature brings to bear. If nature does not supply the proper stimulating influences, then that stimulation can be supplied by a properly adjusted regulating appliance.

The Median Suture Always Existent.

I made a series of sections through the median sutures of a number of adult skulls. These skulls were taken from the dissecting room and the exact age is not known. It is very difficult to decalcify sections taken from this region sufficiently to enable one to cut a specimen thin enough to make a good microphotograph. The median suture does not close as early in life as most men suppose it does, judging by the writings upon the subject. In fact, from my investigations, I do not believe that it ever becomes obliterated. By that I mean that there is never an osseous attachment of the right premaxilla with the left. The bone never fills up the suture to such an extent as to obliterate the suture. The bone may develop to such an extent as to obliterate the suture from the naked eye, but an examination of the specimen with the microscope will reveal a thin layer of connective tissue between the two premaxillæ. This connective tissue between the maxillæ and the premaxillæ is white inelastic tissue, which binds the bones together. The fibres of this tissue pass across from the right to the left and are built into the bone in such a manner as to bind the bone together. I have never been able to distinguish any cells which I would say were osteoblasts. I am aware that in the young subject we would find a number of osteoblasts in the connective tissue between the maxillæ, right and left, and between the right and left premaxillæ. You do not find any evidence of an osteogenetic layer of the periosteum within the connective tissue between the maxillæ, as you find in the periosteum covering the bone elsewhere. There is nothing within the connective tissue between the bone, that is in the con-

nective tissue in the suture which would suggest a greater rapidity of bone development than we find elsewhere. In fact we would expect, from the appearance of the bone and periosteum, that there would be a greater activity of bone formation on the oral and nasal side of the suture than there would be within the suture itself. The right and left maxillæ or the right and left premaxillæ never unite by an osseous union, for some connective tissue always remains between the right and left bone. The bones may approach each other so closely that there will be an interlocking or "dove-tail" effect which will unite them mechanically, but tissue always remains between the two. There is no cartilage between the right and left bone, such as you find in the epiphysis of the long bones; if there were, we might expect to get an increased bone development in that region by opening the suture. However, as the suture is filled with connective tissue, the principal function of which is to hold the bones together, I can see no reason for expecting a greater development of bone by tearing the connective tissue loose from the bone than you would get by a gradual expansion of the dental arches. If you will remember that the teeth have been responsible for the development of the bone which supports them, and that the nose has been developed from what was part of the oral cavity, you see why the force applied upon the teeth will cause a development of bone in parts far removed from the teeth.

Experiments on Lower Jaws of Dogs.

In order that we might study the actual changes that occur in the attempt to open the suture, I began experimenting upon dogs. I am aware that the dentition of a dog and man are decidedly different; however, there is no animal except the man-like apes that closely approach man. At the present time I have not been able to secure apes for my work. There is very little trouble to secure dogs from the city streets, but the age of a dog is always a question of doubt; yet a dog that lives upon the street will not escape the dog-catcher very many trips in succession. The dogs which I secured for these experiments were not over two years old.

In the dogs we have a condition which is both objectionable and advantageous to our use. The two halves of the mandible of the dog never become entirely ossified; the connective tissue such as we find in the suture of the premaxillæ and maxillæ of man binds the two halves of the mandible together. In preparing an anatomical specimen the two halves of the mandible always separate. If it were possible and so easy to open a suture, as we are led to believe it to be by those who advocate the opening of the suture, we would expect that by placing appliances upon the lower canines, and by exerting stress upon those teeth, in short

time we would open the suture between the two halves of the mandible. In fact, it seemed to me to be so easy that I really felt sorry for the dog, as I thought that some morning I would go to the animal room and find the dog with a divided mandible, in which case I would chloroform one dog and try and hold the mandibles of the others until the bone filled in and they united. However, the actual results were very different. I placed bands upon the lower canines and attached tubes to the bands in such a manner as to produce a bodily movement of the canines. After working on these cases eighty-five days I found that the teeth had moved in an almost upright position, but that there was absolutely no evidence of an open suture. When the animals were killed I found that the sutures in those which had been operated upon were more closed than the sutures in those which had not been operated upon. This proved that the force which had been exerted upon the teeth had caused a development of bone around the fibres of the connective tissue with a view of holding the bone together, and not with a view of increasing the distance between the two halves of the mandible, as is claimed in the operation upon children. There was a great amount of bone development around the canines, for you must remember that each canine was moved more than an eighth of an inch and still was not moved out of the alveolar process, as some of the older writers told us would occur if we expanded the teeth too much in the lower arch. Bone developed on the lingual side of the canine to such an extent that the teeth that had been moved were tighter than those that had not been moved. There is no doubt but that the regulating appliance will develop bone, or "build bone," if you want to use the term that has been used by some. However, this developing of bone, or "building of bone," is not the final solution to the retention of teeth, for unless the forces of occlusion are exactly the same as those exerted by the retaining appliances the bone will be again absorbed and the tooth moved to its old position. However, as I am carrying on another set of experiments with this point in view, I will have more to say in regard to this phase at a later meeting. Bone developed not only around the teeth that had the appliances on them, but also around the teeth that were far removed; also, bone developed in the maxillæ as far back as the first molar, which in the dog averages about three inches from the canines.

Experiments on Upper Jaws of Dogs.

In attempting to open the median suture in the maxillæ, the canines again afford excellent anchorage. The advantage again is in favor of opening the suture, because the animals have a longer distance from the zygomatic arch, which would permit the suture to spread in the anterior region with more ease than it would

in the child. The appliances were placed upon the teeth in such a manner as to produce a bodily movement of the teeth. Bands were placed on the canines with tubes parallel with the long axis of the tooth. Arches were used which were made from the regular arch as made and sold by Dr. Brady. More stress was placed upon these teeth than will ever be placed upon the teeth of a child. The appliance produced no inconvenience and the animals suffered no pain whatever. They always were glad to eat any kind of food given them, but for the protection of the regulating appliances, bones were not included as a regular article of diet. They all got fat during the treatment. Upon killing the dogs and comparing them with six which had not been operated upon, some of the results obtained were very surprising. During the experiment of eighty-five days' duration there was nothing observed that would suggest that we were opening the suture, and when the specimen was prepared we found not only that the suture was not open, but that it was more closed than in the dogs that had not been operated on. Again, bone had developed in the neighborhood of the connective fibres which make up the tissue found in the region of the suture in such a manner as to bind the bone together, but not to increase the width of the parts. The appearance of the maxillæ shows that there had been an increase of bone through the entire maxillæ wherever there was marrow within the medullary spaces. The shape of the maxillæ has changed, which is conclusive proof that the widening of the dental arch will change the roof of the mouth or the palatal arch, which fact has been disputed by some men. The bone developed around the upper canines the same as it did around the lower, on both the lingual and labial sides of the tooth, the labial plate of bone developing as rapidly as the tooth was moved and was as thick over the moved teeth as it was over those that had not been moved. Again, as in the lower, the bone on the lingual side of the tooth developed as rapidly as the tooth was moved outward, disproving the theory that after you move a tooth there is always a space left behind the tooth which has to be filled up with new bone during the period of retention. The teeth in these dogs were moved more rapidly than teeth would ever be moved in a child, still we find the bone developed tightly against the teeth. I believe that in a great many of our cases, in fact, in all of them, the bone develops much more rapidly than we think it does, and that the solution of retention is not in getting a growth of bone around the teeth while we are retaining them or moving them, but in establishing the normal forces of occlusion, and until we do get the six normal forces of occlusion the teeth will not be maintained in a fixed position. Bone developed around the teeth upon which no pressure had been placed. In the dogs which had not had teeth regulated all of the teeth dropped out when the skull was being cleaned,

but in the ones upon which we had operated all of the teeth were tight and did not drop out when the skull was cleaned, which proves that there had been a development of bone even in localities far removed from the regulating appliance. It has been observed in clinical cases that when moving one tooth, the ones adjoining will follow it, which is not

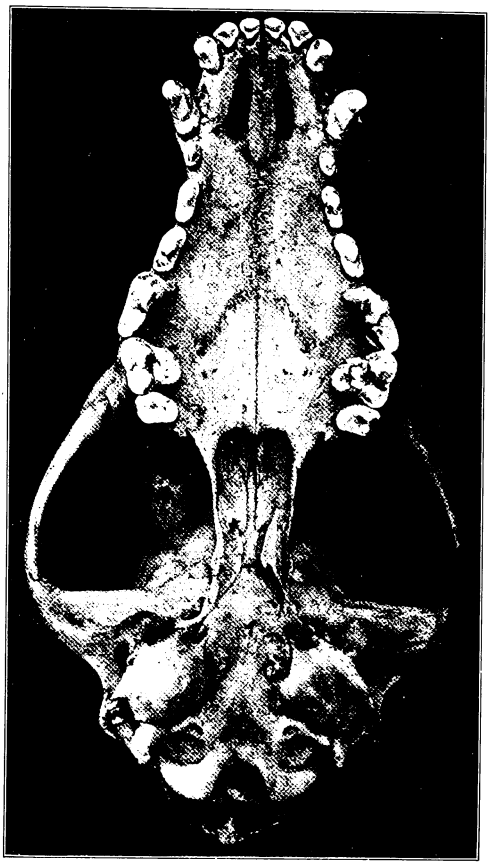


Fig. 11.

entirely the result of springing the alveolus or bone, but it is also the result of cell growth.

In the dogs which did not have regulating appliances on the teeth we found a noticeable ridge of bone projecting lingually, while in the operated specimens we find that the ridge had been absorbed, which is further proof that the palate changes as a result of stress upon the teeth. You must remember that the tissue covering the roof of the mouth is

what has been called muco-periosteum, or attached periosteum, which is composed of the mucous membrane of the mouth and the tissue of the periosteum in that neighborhood. In the attached periosteum the fibres are attached to the bone, and the large number of them make a covering

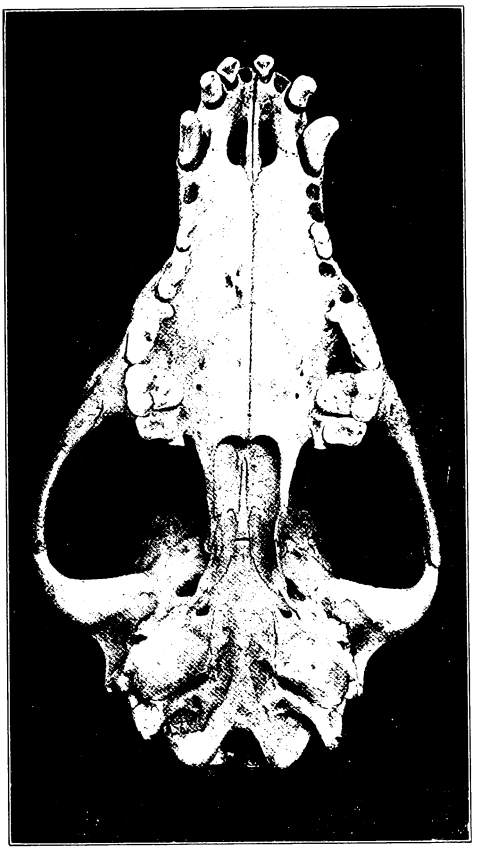


Fig. 12.

which is decidedly inelastic. They are also communicative with the fibres of the peridental membrane, which is also inelastic. Bone will change more rapidly than these fibres will change. Therefore, when stress is placed upon the teeth and transmitted through the peridental membrane to the fibres all over the roof of the mouth, we find the changes taking place that were observed in the dogs and are seen in patients.

Next year I hope to be able to give you the results of a greater

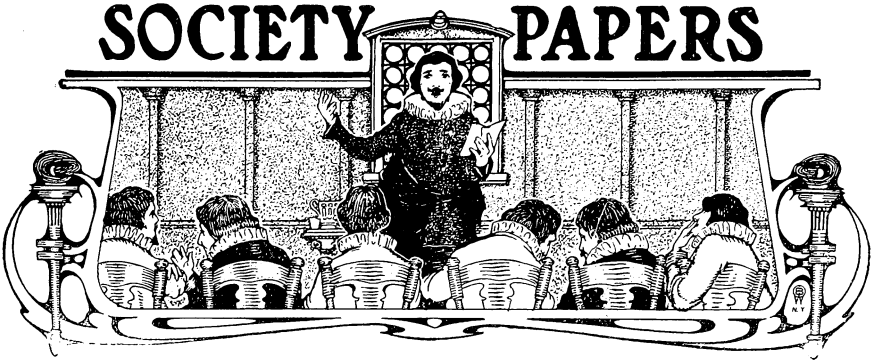
number of experiments, along with the microscopical findings in cases in which the teeth have been moved.

Conclusions. First, the opening of the suture is a more difficult proposition than we had supposed. Second, the evidence in favor of the opening of the suture that has been presented is not sufficiently positive to prove that the suture has ever been opened in any case. Third, there is no histological evidence to lead us to believe that the bone develops any more rapidly within the region of the suture than anywhere else. Fourth, the development of the face from the child to that of an adult could not be brought about by the addition of bone to the suture. Fifth, subperiosteal bone development is the form that is responsible for the changes such as occur in the development of the face and the movement of the teeth. Sixth, there is no cartilage in the region of the suture which would cause a development similar to that which is found in the epiphyseal centres.

Therefore, let me say that, as a result of my experiments and anatomical studies, I am convinced that the stress which is placed upon the teeth in trying to open the suture only causes a development of bone through the entire maxillæ and nasal spaces, which accounts for the improvement in the individual as described by Drs. Barnes and Hawley.

Fig. 11 is from a photograph of the skull of a dog which had appliances upon the teeth; Fig. 12 from one which did not have the teeth regulated. The development of bone around the teeth and changed appearance of the suture can be noted.

SOCIETY PAPERS



Banquet to Dr. Truman W. Brophy.

The Chicago Dental Society tendered a testimonial banquet to Dr. Truman W. Brophy on Saturday evening, February 1st, at the Hotel LaSalle, in Chicago. A very distinguished company of nearly five hundred assembled to do honor to the guest of the evening, prominent practitioners from all parts of the country and several from abroad being present. It was an exceedingly inspiring occasion and very much credit is due to the committee for its splendid executive management and attention to detail. The after-dinner speaking was very much above the usual order of excellence. Dr. C. N. Johnson, who made the first address, offered one of the finest of the many fine speeches which he has made, thus beginning the postprandial oratory in a way which inspired the others to do their best, with the result that most inspired addresses were delivered by Dr. Edwin T. Darby of Philadelphia, Dr. Newell S. Jenkins of Paris, Dr. W. A. Evans of Chicago, Dr. George F. Brush of Winnipeg, Canada, and Dr. W. M. Lawrence of Hamilton, N. Y.

After the regular speeches a number of presentations of gifts from Dr. Brophy's admirers followed. A dozen beautiful silver plates from "Friends in New York"; eighteen silver service plates from "Friends in Many Cities"; a superb silver waiter and tea-set, loving cup, silver tray, etc., from the Chicago Dental societies; bronze bust of Lincoln from the American Dental Society of Europe; bronze bust of Chapin A. Harris, from Dr. Vincenzo Guerini, of Naples, Italy, and a number of wonderfully engrossed resolutions on parchment, from societies abroad, were among the many numerous gifts.

The following is a brief biographical sketch copied from the menu:

Truman William Brophy.

1872	D.D.S. Pennsylvania College of Dental Surgery.
1880	M.D. Rush Medical College.
1894	LL.D. Lake Forest University.
1848	Born April 12th at Gooding's Grove, Will County, Illinois.
1852	Family moved to St. Charles, Illinois.
1855	Moved to farm in township of Campton, Kane Co., Illinois. Attended country school in "the old log school house."
1862-3	During winter attended school in the village of Blackberry, now Elburn, Illinois.
1863-4	Attended Elgin Academy.
1864-5	Attended Elgin Academy.
1866	Family moved to Chicago.
1867	Began the study of dentistry in the office of Dr. J. O. Farnsworth, at 116 Randolph Street, between Clark and Dearborn Streets.
1867-9	Attended Dyrenforth's College of nights from April 1, 1867, to June 1, 1869.
1869-70	Attended Chicago Athenæum of nights during winter.
1870	Took charge of Dr. Farnsworth's office. Purchased office of Dr. Farnsworth in October.
1871	Burned out in great Chicago fire. Joined the Chicago Dental Society.
1876	Joined the Illinois State Dental Society. Delegate from Illinois State Dental Society to American Dental Association.
1877	First important dental paper: "The Treatment of Exposed Pulps," before Illinois State Dental Society. Member Committee Chicago Dental Society appointed to confer with Committee from Rush Medical College on organizing a dental college.
1880	President graduating class of Rush Medical College. Elected Professor of Dental Pathology and Surgery, Rush Medical College.
1881	Member legislative committee of Chicago Dental Society, which drafted the bill which became our first State dental law. Took the initiative to organize the Chicago Dental Infirmary, which subsequently became the Chicago College of Dental Surgery; Corresponding Secretary Chicago Dental Infirmary. President Chicago Dental Society.
1883	President and Dean of Chicago College of Dental Surgery and Professor of Oral Surgery. Proposed and took initial steps to organize Section on Dental Surgery, American Medical Association.

1886 Made first operation for immediate closure of congenital cleft palate in young infant, before class.

1890 Purchased lot for Chicago College of Dental Surgery.

1890-1910 President Commission of Education, International Dental Federation.

1891 President Illinois State Dental Society.

1893 Chairman Section Oral Surgery of Columbian Dental Congress. Erected north half, Chicago College of Dental Surgery building.

1896 Wrote chapter on Early Operations for the Closure of Cleft Palate, Roswell Park's Surgery. Erected south halt, Chicago College of Dental Surgery building.

1897-8 President National Association of Dental Faculties.

1900 Delegate from American Dental Association to First International Dental Congress in Paris.

1902 Member National Swedish Dental Association. Medal "Homenaje al Talento" from Professor J. J. Rojo of Mexico City.

1903 Medal for "Merited Distinction" from Odontological Society of Paris, France. President for the United States of the Fourteenth International Medical Congress at Madrid, Spain.

1904 Delegate for the United States to Fourth International Dental Congress at St. Louis.

1906 Awarded Fellowship Medal by the Dental Society of the State of New York.

1910 President Commission of Education, International Dental Federation. Chairman American Delegation to Fifth International Dental Congress, Berlin.

1912 President Chicago Dental Faculties Association.

Member Odontological Society of France.
Member Association of Military Surgeons of the United States.
Member Surgical Staff Passavant Hospital.
Member Surgical Staff Provident Hospital.
Member Surgical Staff Presbyterian Hospital.
Member Illinois State Medical Society.
Member Chicago Medical Society.
Member Chicago Odontological Society.
Member Chicago Medico-Legal Society.
Member Chicago Pathological Society.
Member Society of Medical History.
Honorary Member Society Austrian Dentists.

Honorary Member American Dental Society of Europe.
Member Sociedad Dental Mexicana.
President Chicago College of Dental Surgery.

Presentations.

The following is a complete list of the presentations:

Decoration of "Officer of Public Instruction," Baron H. De St. Laurent, Chicago Consul for France.

International Dental Federation, Dr. H. L. Wheeler, New York.

American Dental Society of Europe, Dr. N. S. Jenkins, Paris.

Italian Stomatological Federation, Dr. Arrigo Piperno, Rome.

Spanish Odontological Society, Dr. E. M. S. Fernandez, Chicago.

Dental Surgeon Association of Denmark, Dr. A. T. Rasmussen, La Crosse.

National Society Austrian Dentists, Dr. Carl Beck, Chicago.

Norwegian Dental Association, Dr. Chas. S. Omsberg, Chicago.

Belgium National Dental Federation, Dr. G. M. J. J. Oury, Liege.

German Colleagues, Dr. Hugo Franz, Chicago.

Netherlands Colleagues, Dr. Thos. P. Hinman, Atlanta.

American Dental Club of Paris, Dr. R. Ottolengui, New York.

Dr. Vincenzo Guerini, Naples, Dr. B. Holly Smith, Baltimore.

Dr. Kazuo Sato, Tokyo, Dr. Watari Yamada, Chicago.

New York Friends, Dr. W. W. Walker, New York.

Friends in Many Cities, Dr. J. R. Callahan, Cincinnati.

Illinois State Board of Dental Examiners, Dr. T. R. Broadbent, Chicago.

Chicago Dental Society, Dr. C. R. E. Koch, Chicago.

Chicago Odontological Society, Dr. C. A. Case, Chicago.

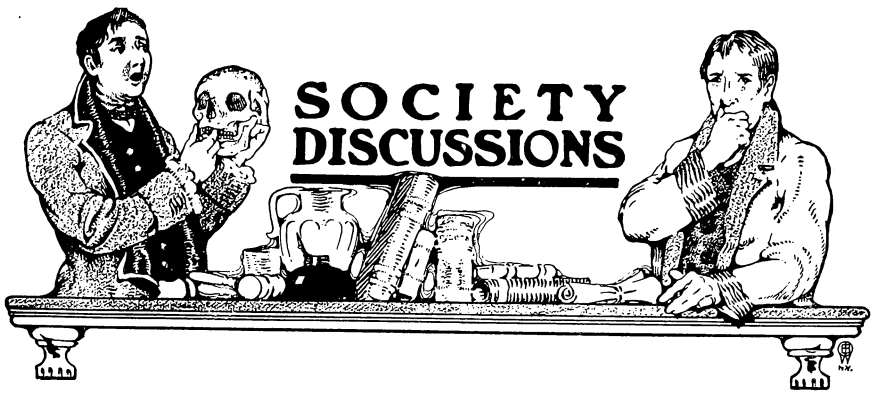
Chicago College of Dental Surgery Alumni, Dr. Lewis S. Tenney, Chicago.

Chicago College of Dental Surgery Faculty, Dr. W. L. Copeland, Chicago.

Committee, Dr. G. W. Dittmar, Chicago.

Guest Book, Dr. W. V. B. Ames, Chicago.

Dr. Brophy made a wonderfully fine speech in recognition of the honors bestowed on him, and his many friends were delighted to note that he appeared to be in splendid health and as virile as he has been at any time during the past five years.



Second District Dental Society.

October Meeting.

A regular meeting of the Second District Dental Society of the State of New York was held on Monday evening, October 14, 1912, at the Kings County Medical Library Building, No. 1313 Bedford Avenue, Brooklyn, N. Y.

The President, Dr. Thaddeus P. Hyatt, occupied the chair and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

President Hyatt read the following address:

President's Address.

While I know that we have changed our By-Laws and that it is not necessary for the president to present an address at our October meeting, I feel, however, that it is desirable to offer some suggestions for your consideration, and to sound a keynote for the coming year which all may work for and make a permanent part of our society.

Experimental Care of School Children.

To-night the chairman of our committees will present reports giving an outline of their work, and I will only permit myself to express a few words relating to the work to be done on one or two hundred school children of this city. There still seems to remain in the minds of some of our members the impression that this work is some kind of charity.

This is not so. Nor is it any philanthropic motive on our part to relieve the sufferings of school children. We wish to ascertain positively

and as scientifically as possible what will be the result upon one or two hundred children if their mouths receive proper dental attention. Remember, this work is to be conducted under the direct supervision of the Board of Health and Board of Education. This in itself is significant and important. If what we believe to be true is proved to be true under carefully prepared test conditions—namely, that the physical, mental and moral life of the child is greatly improved by careful attention and correction of malconditions of the mouth—then the value and importance of dental surgery will receive an official recognition such as it has never received before. This must raise the standard of our profession, and will confer a higher and more honorable position upon its members. The benefit to all of us is hard to properly estimate at this time. I ask of you to remember that no work of this kind has ever been attempted before which promises such conclusive proofs that will be acceptable to laymen, the medical profession and those in authority. The details of how this work is to be conducted I shall leave to the chairman of that committee to present to you this evening.

Proposed Sinking Fund.

To me it has seemed that the life, the work, and the conduct of our society should always be an example for each individual member to follow. That attendance at our meetings should instill into the very life of each of us a nobler impulse which should raise us to a higher and better way of living and conducting our practice. It is with this idea in mind and heart that I suggest that some action be taken, so that there may be set aside each year a stated sum of money until we have in bank the full limit we are allowed to hold by the charter of our State Society. The living from hand to mouth as our society has been doing for the past twenty years or more, is neither desirable nor a good example to set before any of us, no matter how young nor how old he may be.

Visits Exchanged Between District Societies.

As men grow to know each other better and more fully, misunderstandings between them are less liable to occur and more encouragement and help will therefore be given to those in trouble. Believing that members of the different District Societies of our State should be better acquainted with us, and we with them, I wrote to the presidents of the District Societies requesting them to meet and lunch together at the last convention of our State Society in Albany. All but one attended, and he was prevented only because of important domestic matters, that absolutely necessitated his presence. The luncheon was most enjoyable. Many had never met

before. Everyone realized what it would mean if the members of our profession knew and understood each other.

The presidents of all the District Societies of our State have promised to attend some one of our meetings during the coming year, and to bring with them as many of their members as possible. I know you will give them hearty welcome. I, as your president, have promised to return these visits and to take with me as many of our members as are willing to sacrifice some of their time to visit their conferees in different parts of the State. You are all heartily and cordially invited to help me in these visits. At these meetings during informal conversation, subjects of interest to our profession in our State will be discussed and ideas exchanged, so that we may view all sides of these questions. Then at our state convention we shall better understand the arguments presented, and the motives underlying their presentation, because we shall know and understand the man presenting them.

Who can appreciate our struggles, our difficulties, our worries, our hopes, and our despondencies, our joys and our pleasures, as well as our own confrères? Who has not attended some meeting depressed and worried over some work in hand, some money troubles, or unappreciative patients, and meeting his fellow member, receiving a hearty greeting, hearing suggestions made or honest confession given of some failure, has enabled that member to go home refreshed and helped? And, too sad to state, yet I fear ofttimes true, some have come knowing but few and have not seen them, while others not offering hand or voice in welcome have allowed that member to leave us with a feeling of loneliness and depression. This should never be, and none of us ever wishes it to be. So now I offer to you this very keynote for the coming year. Let us get together. Let each of us go out of his way to meet the man he does not know. Ask his name, give him ours. Invite him to our office, and go to his. We will gain ideas from our visits, and it is a pleasure to give ideas and suggestions that will help others. I shall ask four or more members to constitute themselves a committee to meet all comers and introduce them to our members. I shall ask different men for each of our meetings.

After all is said and done, we are but men, and human, all children of one God, and the longest life of any of us is too short to express all the good each is capable of expressing. It needs kindness and encouragement to bring the best forth. Therefore let us help our fellow member, by knowing him, encouraging him, and by welcoming him. Be the first to greet him.

If I can do naught else this year but help our members to come closer in thoughts and feelings, to really grow fonder of each other,

thus melting away all barriers of separateness, I shall feel I have made some small return for your kindness and encouragement towards me. Let us remember that the greatest thing in the world is love, and that it has just as proper a place here as in our homes.

Paraphrasing a well-known motto I would say:

There's so much that is good in the worst of us,
And so much that is bad in the best of us,
That it really behooves everyone of us
To say something kind about the rest of us.

The paper of the evening was read by Dr. W. D. N. Moore, of Chicago, and was entitled "Difficudt Problems in Operative and Prosthetic Dentistry Solved by Casting." The paper was illustrated by a number of models.*

Discussion on Dr. Moore's Paper.

Dr. F. C. Van Woert. I am extremely pleased to have first read the paper, and then to have heard it, and to have seen the beautiful models. I am also very glad to hear the Doctor emphasize and bring forth one particular point in the beginning of his paper and that is, the protection of the gum septum in the restoration or filling of teeth. I think one of the most delightful papers I ever read was that published in the *Dental Review* of September, by Dr. Arthur Black, of Chicago, on this very subject. It has been a custom of mine, for many years, contrary to the advice of some of my good friends, to insist upon ample separation in order to restore full contour for the preservation of the space needed to protect the septum. It is not a question of merely filling teeth. We should restore teeth to as nearly the normal condition as possible.

I think the same should have been done under the old régime, when gold and amalgam were used for restoration. The restoration of teeth and the protection of the soft tissue, in cases where the teeth have migrated towards each other, as in the models displayed by the essayist, I believe are more easily done by the casting method than by any other means. Where the space is too great for the introduction of a contour that will restore contact a good result may be obtained by securing a proper occlusion, with a cast inlay, which is impossible with a gold foil or an amalgam filling. The occlusion must be built up so that the tooth will retain the position in which it is found when the filling is inserted, and not migrate further. I think that is not possible by any other means than by the casting method.

*Dr. Moore's paper fully illus'rated, was published in the January issue of ITEMS OF INTEREST.—ED.

I have made the statement and the claim that I can carve a porcelain inlay for a contour, or an occlusion, almost equal to that of the cast gold. I do not mean by that that I can get all the fine detail, but I can get the point of contact which preserves the essential occlusion, so so that the tooth will stand up in the position in which you find it when the filling is inserted; but I believe a cast filling is better for the protection of that tooth, whether it is as fully restored as in these models, or whether it is held in place by the occlusion itself.

Crown and Bridgework.

Now as to the question of crowns. I think I am on record, and many of you know and have heard me say this before; I do not think there is anything that has come to the science of dentistry that has been such a curse to us all as crown and bridgework. (Applause.)

Dr. Chayes. Used to be.

Dr. Van Woert.

Is now. However, I think the members of the profession will realize there is now a way out of the difficulty, and not depend upon past methods. It is just as absurd now to try to make crowns without casting as it would be to try to fly without an aeroplane. The difficulty with the casting has been that we are wedded to our old methods; but we must change them, otherwise we will get into trouble.

Cast Fillings.

I am extremely pleased to find a large percentage of the cavities in these models with the corners rounded instead of directly square, as is so universally prescribed for gold foil or amalgam work.

Cast fillings are purely a mechanical problem, and we must get down to common every-day mechanics before we will be successful with them, and before we get what we need. You can place gold foil in such cavities with a degree of certainty that you will get a satisfactory result, but you cannot do it with a cast gold filling, or an inlay of any kind; therefore we must make a cavity which is so shaped that we get a perfect draught (whether it is by the direct or indirect method), and with little chance for any distortion at the margin. To discuss the mechanical principles of a cast inlay would consume a whole evening, but there are certain principles that must be followed, otherwise the cast fillings will prove a failure, and the first and foremost is a perfect draught, and curved lines by which there is no chance for trouble at the sharp angles laid down in other methods of cavity preparations.

Filling Children's Teeth.

I can hardly agree with the essayist in his position as to the treatment of children's teeth. I believe there are many cases where it is possible and good practice to make permanent operations; but the majority of children whose mouths are so badly off that they require fillings of that kind, are children whose parents do not appreciate when a perfect operation is made, and who will not follow your instructions and look after those children when you have made those extensive operations. After four or five years they come back with things all gone to rack and ruin, and you get the blame. I believe the least work you can put into a child's mouth, and preserve the teeth until that child is responsible himself for what is taking place, the better off you will be, and the better off the child will be.

It is a number of years since our good friend, Dr. Ottolengui, got on the floor and berated the whole dental profession because they did not put gold into all children's teeth. In my thirty-six years of practice I have yet to see such operations, not only from his hands, but from others, that were universally successful in children's mouths. There are cases where such operations are a work of art, and where children and parents both appreciate it; but those are exceptions, I think.

Casting in Prosthodontia.

As to prosthesis, I do not understand just what the essayist means when he speaks of the mutilation of roots for abutments. If he means the cutting down of roots so that they are within reasonable distance of the gum, say two to three millimetres, I do not agree with him. I think the roots should be cut down to a point where it is possible to make it conical, and where a crown or abutment can be fitted so that there will be no possible chance of leaving irritation to the surrounding tissues, and there is a principle involved there which, when carried out, secures that against any possible danger of coming off or breaking down, and that is this: all metals have their strength, in proportion to the thickness and carat (if gold) or the class of metal. One of the common principles laid down by Haswell in his *Machinist's Pocket Book* is, that a screw inserted into a piece of iron with a suitable thread upon it, is just as strong if inserted one-half an inch as if it were inserted ten inches. You cannot get more than the strength of the metal out of it. If there is the maximum strength in the bridge or abutment you have all you can ask for, and anything you leave of that root beyond that is bound to be a menace to its fit.

The older I grow, and the more experience I get, the less use I have for bridgework. Crownwork is indispensable. Bridgework—that is, fixed bridgework—can be substituted, and I think a removable piece is very much better and healthier for the patient.

Duplicate Teeth in Bridgework.

The Doctor's claim that by the use of the cast method in crown and bridgework, particularly in bridgework, facings can be duplicated, I hardly agree with. Most of you know my position on that. I do not believe that a swedged backing or any attachment to a facing will fit a duplicate without adjustment or grinding. Take a facing to-morrow of any selection you like; take the number of it; cast a backing for it; take it out, and put in another facing of the same mould; then try half a dozen of them, and I defy you to get any one of them to fit. The only one of them that will really fit is the one for which the backing was cast. That is because no two of them are alike. They are made in the same mould, but the pressure is different every time, and the shrinkage of porcelain is in proportion to the pressure. If there should by any possible chance be two alike, it would be a mere accident and it would happen only once in a hundred years. I do not mean the cast method is not a good thing, but I believe statements of this kind lead men, young men particularly, astray and they think offhand that they can duplicate anything they do by following this method.

I have never seen more beautiful work than this displayed to-night. It is all a perfect work of art, and I think the essayist has done us one of the greatest favors in coming here and giving us this most admirable paper; but I think he is like many of the rest of us, myself included. When I go somewhere and read a paper, I make statements sometimes that perhaps are misunderstood. We are here to find out the true facts of the case. The true facts are that you cannot put the second facing into the backing or box made for the first; therefore I believe it is better to make that clear to everybody, so that there will not be an anticipation of something that cannot be done. I am extremely obliged to the essayist and very glad to have met him, and hope I shall have the pleasure of meeting him again and of seeing some more of his beautiful work.

President Hyatt.

We have with us the distinguished Professor of Operative Dentistry of the New York College of Dentistry, and we would be pleased to hear from him.

Prof. A. R. Starr.

I feel a great deal as Dr. Van Woert does, that we have been somewhat overdoing bridgework, especially as he stated "fixed" bridgework. Dr. Van Woert is right in his contention that we should have the roots properly trimmed, to get accurate retention. There is a great deal of pyorrhea and other trouble caused by improper trimming. I have been very much pleased with the exhibition the essayist gave us. Some of the models are very beautiful. I shall be more pleased to have him tell us how these re-

sults are accomplished. It is rather difficult for us to make some of these large castings. There are so many factors to be considered in order to overcome the difficulties, that any little principle of technique, or any little information in that respect is very welcome to us all.

I am sorry I cannot add more to the discussion. I have not had very much experience in casting work. I have not entirely discarded my pluggers. I like to rely on the old method of introducing gold foil into certain cavities. I think often we get better results in that way; but I realize that we have many cases which we can treat with the casting method where we get better results than with the old method.

Dr. Charles Fish. I do not know that there is very much that I want to say except this, which may not have a direct bearing on the paper; but I believe that the dentists of to-day, as well as the dentists of every day up to now, have neglected too much doing comprehensive work. They let patients come in, and tell them a certain tooth is broken down, and they make an appointment to fix that tooth without regard to the surroundings, or the other teeth in the mouth; without making a comprehensive study of that mouth. It will pay any dentist who has a patient coming to his office, even for a casual piece of work, to stop long enough to thoroughly examine that mouth as nearly as he can in the time he may have at his disposal. It is not as important to have that tooth filled as to have the whole masticating apparatus built up, perhaps. Those patients do not come to you knowing their needs. They only know they need that certain thing, and I want to insert a plea right here for the fellow who is losing opportunities to do nice work for his patient, and to make money for himself besides, by neglecting the opportunity to instruct his patient and to make a comprehensive study of the case to which his attention has been called by a particular tooth.

I want to congratulate the essayist on the beautiful work he has shown, and thank him personally for the paper. I do not, however, approve—if I may be excused for raising my small voice in disapproval—of the fixed bridges between incisors. I think there is possibility of recurrence of trouble there. I would prefer to make a removable piece. The work is really too beautiful to be criticised, but I would just like to make that little dissent.

Dr. Ottolengui. I had no idea whatever of discussing this paper until Dr. Van Woert threw a brick at me. I am not at all surprised that Dr. Van Woert admits that he does not have success in filling children's teeth with gold, because privately and confidentially, he has told me he does not fill children's teeth,

at all; and I am not surprised that he has not seen any of the extensive gold work I have done for children, because those patients do not leave my practice! (Laughter.)

Jesting aside, one feature of the paper with which I was particularly delighted was the filling of children's teeth in this manner. I understand the title of the paper was "Difficult Problems in Dentistry Solved by the Casting Method." Certainly it solves the problem of filling children's teeth. I have been singing this anthem to the profession for some time—the filling of children's teeth with gold. One said it was a difficult proposition. Another said it was too expensive; that parents would not pay the price of gold to fill their children's teeth. Both of those arguments, which were given to me all over this country, and in Canada, have been most beautifully exploded since then, because orthodontists now find it a great deal easier to get $1,500 out of a parent for regulating his child's teeth, than the family dentist does to get $15 for a whole set of teeth for the father. That is a fact that has not been appreciated. The orthodontist can tell you something about that, and I know, because I practice some orthodontia myself in addition to my other work. I get just as much for an inlay in a child's tooth as for an adult's, and without complaint. It is a curious thing that I should be told to-night that no permanent fillings should be put into children's teeth, but that we should patch those teeth and wait until the children are responsible themselves. Not one of my children has come to me thus far this fall who has needed to have a tooth llled, and it is because those particular children have all had inlays inserted in the morsal surfaces of their permanent molars, and because the inlays are doing permanent work.

I have never advocated that a tooth should be filled regardless of conditions, but where a temporary filling must be used, what I have said is, "fill the teeth so temporarily that you will be obliged to fill them again, and let the patient understand that they are not filled permanently, but that they will have to come back to have them filled over again." There are only two things to put in a child's permanent molar—gutta percha, because it will not last as long as cement sometimes does, and gold; and I am putting in more gold now, because I can do it with less regard to strain. Many cases where I was obliged to use gutta percha year after year, or six months after six months, or three months after three months, I can fill now with the gold inlay at the first treatment; and it is not only the casting process that makes this possible, but the totally different shapes of the cavity. Cavities for inlays may be prepared with stones, and so may be prepared wet, and it makes it less painful. If any problem has been made easier, if any problem has been solved by Wm. H. Taggart, it is the difficulty of filling children's permanent

teeth with permanent gold inlays, and I stand on this gold proposition with both feet now, instead of on one foot, as formerly.

President Hyatt. Perhaps it has changed since I went to college, but if I can put the rubber dam on, I have always thought the preparation of the cavity would be less painful than if done without.

Dr. Ottolengui. I do not want to leave the impression on this audience that I do not put on the rubber dam; but when I say wet I am really thinking of cool. You may prepare a cavity dry, and keep a draught of air on it, and keep it cool, but you cannot do that so well with stones. There are very small, knife-edge sharp Gem stones procurable now with which you can cut the sulci from end to end and crosswise much more rapidly and better than with a steel instrument, and you can do it best under water. It is not that you cannot do it with the steel instrument, but you can do it with the stone; and to use the stone you must have it wet.

Dr. Nies. I cannot view that beautiful work without asking the doctor how he does it. I am interested in knowing whether those castings were made by the impression method or by the direct method. I would like to know what investment material he uses, and what machine he casts with. I am sure we are all interested in his technique. The results are so beautiful that we would like to know.

Dr. Chayes. Before I take up Dr. Moore's paper I will take to myself the privilege of answering the question that Dr. Nies asked, and I will wager that I am right. Dr. Moore uses Dr. Taggart's machine and Dr. Taggart's investment.

I want to compliment the essayist on the beautiful technique, the beautifully rounded-out work he has shown us, and I would like to know more of him.

There seems to have been raised to-night a point as regards the success of crown and bridgework, and of its being a curse heretofore. This is true, and if we continue practicing bridgework exactly along the methods we were taught to use, this curse will multiply as our cases multiply. It seems to me it is about time that men who practice crown and bridgework should begin to realize that they have no right to use a cuspid and a third molar on one side, and swing a bridge onto those two attachments, because the service that cuspid performs is entirely different from the service the molar is called upon to perform, and if you unite those two abutments with a bridge you subject the cuspid to a strain it was not intended for, and vice versa. Neither have we the right to

construct a piece of bridgework and rigidly unite both sides of the mouth, because at no time in mastication are both sides brought into play; and the minute you unite both sides, and you use one side for mastication, the bar or attachment transmits the strain, which becomes a torsion on the other side, and is not dissipated until it has brought it to that side of the abutment. It is only a question of time when all these mechanical principles will be comprehended. It is a question of breaking the stress which performs a different function. If you have a piece of bridgework from the third molar to the cuspid, you must break your stress at the cuspid abutment in such a way that there will be motion at that abutment, in proportion to the displacement of the tissues that carry that bridge. In no other way can the stress be taken up.

That casting has helped out these problems is absolutely true, and as we go along and discover these little things that will ultimately clear away all errors and make a perfect piece of mechanics out of a piece of bridgework that goes into the mouth, so does our debt increase to the man who gave us casting. The reason why casting is so much misunderstood to-day is that we have taken the work conceived by the master, and we have attempted to add to it, not in the proper sequential way, but many of us have torn his way down, and have attempted to substitute our own ways. Many of us have gone on a tangent instead of along the path Taggart has pointed out, and using the technique Taggart has given us. If we had all followed him, we would know a great deal more about it. The proof is that the men who *are* following Taggart and using his material are doing the best work.

I want to thank the essayist for having heard his paper and for the privilege of seeing his work. I do not quite agree with his technique, but I will not touch upon that. I hope to see more of his work, and more of him.

Dr. Moore. It has been a pleasure to me to hear the enthusiastic discussion that has taken place, and I am glad the paper has been so fully discussed, but I see there has been a little misunderstanding of some ideas, which I will briefly refer to because it is getting away from the line of the paper.

As to the question of supplying a lateral or a central by attachment to the remaining anterior teeth, instead of using a removable piece depends much upon the case. These models must not be taken as the only way certain results can be gained. In some cases I would be in favor of a removable piece of work; in others I would use a fixed bridge, as demonstrated. I want to make it clear that these models are presented as specimens of casting and not as representing the only way work can be done. They are simply used to demonstrate in a way what casting would do,

where previous to this we could not as conveniently or as successfully treat many cases. Since we can cast those pieces without displaying gold, we have overcome an objectionable feature common to bridgework, and we can cast small removable pieces with a few teeth equally well.

Restoration of Contact Points.

Dr. Van Woert mentioned separation of teeth for contact of fillings. I agree with him, and regard it as necessary not only to get contact, but it is necessary to put those teeth in their proper position to afford space for the gum septum. Contact point can be made almost ideal with regard to location, area and density.

It has been said that pure gold cast is not as hard as pure gold malletted. You can easily flow a little solder in the region of that contact point and make a hard surface at point of stress or wear.

I know of no one thing that is more overlooked and yet is of such importance to the mouth as the loss of the first permanent molar, upper or lower. I am glad Dr. Van Woert has emphasized the necessity of contact points in fillings. In the loss of the first permanent molar it is not only a question of contact, but the occlusion is interfered with and only a small part of these occlusal surfaces is in occlusion. The cast inlay can remedy these conditions better than any other method known to us at present.

Cavity Preparation.

Cavity preparation is getting a little away from the paper. It is one of the first important steps, however, that makes for success. Cavity preparation is essential, and it is just one of the things in the whole procedure that must be taken care of in order to get best results. I do not know any place where you can afford to overlook care, but cavity preparation is the first step, and if any idea is entertained that you can get a good casting for an improperly prepared cavity, it is a mistake, and such a thought might as well be abandoned at once.

Inlays in Children's Teeth.

I do not agree with Dr. Van Woert in regard to inlaying children's teeth. He speaks of the lack of appreciation, which may be true at times, but this should make no difference to the operator, as work should be as good as possible or not attempted at all. I have worked for a number of children—not as many as Dr. Van Woert—and I expect the appreciation was varied with each individual, but I did not stop to consider this, for I knew the anxiety of the parents to have their children's teeth saved, and worked with all the energy and all the fight there was in me to accomplish this. The gold inlay did the greatest good considering strain on patient and the permanency of results. I got some help from oxyphosphate of copper, but only tem-

porary. The gold inlay will give results, not only preserving children's teeth, but the so common flat restorations due to dissolving cement can be taken care of in an almost ideal manner. I am sure there will be appreciation in the hearts of patients as they grow older. If not, there is the satisfaction to ourselves that we have done our duty, and this is a great deal to help us.

I have the greatest respect and regard for Dr. Van Woert, but I probably would have to live to be as old as he is before I will give up the opinion I have in regard to the use of inlays in children's teeth. (Laughter.) If there is that nervous condition that will not stand it, we should be considerate of such conditions; but where we can prepare these cavities, and we can in the ordinary cases, and they can stand it by short sittings, we should do it, not only for tooth preservation, but for contour and proper restoration of tooth form, and consequently healthy gum septum. Children should not be taught that you must fill their teeth several times before they are twenty years of age. Why should not a child know that a tooth filled can remain filled? I am convinced, and by experience, that much efficient service can be rendered the child by use of the gold inlay and no patient is more important than these youthful ones.

Tooth Mutilation.

About mutilation of teeth, the point is this:—Instead of cutting probably a good tooth to admit of a crown, whether a shell crown or any other style of crown, I think it much better practice to use an inlay properly fitted to a cavity formed to offer a strong attachment. Of course, if the natural crown is already broken down to the gum, then I do not make any argument for using any other attachment than the crown.

Duplication of Facings.

In regard to the duplication of the facing, in a measure I agree with Dr. Van Woert. The difference due to molding and fusing must play in a slight measure some part in getting a uniform size of tooth, but we do now come nearer replacing with a duplicate than we did with the old method, and no record kept at all. It is not perfect, I will admit, but on a bridge with two or three abutments, we are not justified in removing the entire bridge, involving liability of fracture to roots, where repair can be accomplished in this manner and come nearer to accuracy than by any other method.

Dr. Starr asked me how I accomplished these results? Two or three of these are not my cases; I have had the loan of them by the kindness of Dr. Goslee. All I can say is, hard work and accuracy of detail. As to any secrets, I have none. Simply get your coat off and get down

to hard work and leave nothing undone. Every step must be certain and accurate. Care and close application to detail are the important factors in gaining best results.

We should be very careful in the selection of materials for casting, and there is nothing too good for us to use for this purpose. Be always on the lookout for something better than we now have, but materials alone will not do all. It is mastering detail. In bridgework better results can be had from casting small pieces and later assembling these. The tendency to a change in form in metal when melted, even if only slight, is the cause of many poor castings.

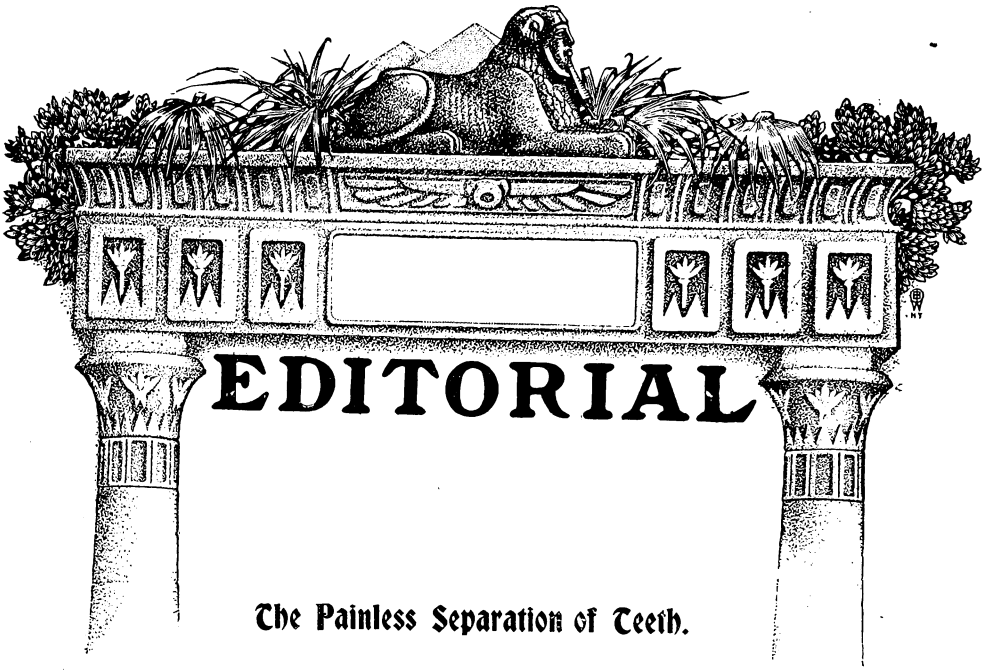
The suggestion made about informing a patient as to the real conditions existing in the mouth, instead of following his ideas in the matter, is very important. So many people get an idea that a certain tooth is giving them trouble, yet it needs only a glance to see that the whole mouth is in trouble. I have noticed this especially among the younger men; they either do not recognize the conditions, or they are opposed to telling the patient that the whole mouth is involved instead of a certain few teeth. The failure to grasp the condition is a serious thing. Simply treating the one or two teeth that the patient wants to have treated is a mistake. Make models and study these things as orthodontists would, and make up your mind where the trouble is and what is to be done, and you will find, as in many of these larger cases that I passed around, instead of one part of the mouth being treated, sometimes, as the patient intended, they go away with the whole of the mouth changed. It is the duty of the dentist to correct the conditions from the proper standpoint.

In regard to the fixed bridges, I will not take that matter up. The paper does not deal with that. There are cases where I would not use them, and cases where I would not use removable bridges.

I want to thank Dr. Ottolengui for what he has said in regard to the care of children's teeth, and I see he has not changed his mind. I assure you it has been a pleasure, indeed, for me to be with you this evening, and I wish to express my appreciation and gratitude for your kindness most cordially.

Dr. Johnson moved a vote of thanks to the essayist of the evening, which was unanimously carried.

Adjournment.



EDITORIAL

The Painless Separation of Teeth.

In the January issue of ITEMS OF INTEREST Dr. Van Woert described a method of painlessly separating teeth. As it is our belief that a correct comprehension of technical details of operations which involve mechanical processes, can best be conveyed with illustrations which appeal to the eye, thus aiding the verbal description, we used no less than four illustrations in order to make clear the several steps of the method. We believed, and still believe, that we presented to our readers, and to their patients, a valuable New Year's present in thus publishing and illustrating the very last word in the matter of separating teeth painlessly and expeditiously. Within a week Dr. Van Woert had received about a hundred letters from dentists and from dental dealers asking where the silk might be obtained. This shows that the majority, at least, understood what Dr. Woert was endeavoring to teach.

But alas for human nature! Many of us are so enamored of our own methods, that we scarcely give sufficient attention to the other man, telling of his way, to really grasp his idea. For example, one gentleman, in perfect good faith, and assuredly with the kindest motives of helpfulness writes as follows, to Dr. Van Woert:

Separating with Tape.

He declares that he uses "ordinary sewing tape," and adds: "It has all the advantages of the ligature silk of which you speak (sic?) and which I used previously to using the tape, and to my mind has the following additional advantages. The entire operation can be done by the patient, thereby taking none of the dentist's time, and any amount of separation can be gained, etc."—"The method is as follows: If the patient is to be seen on Wednesday, I give him a piece of tape and tell him to put it between the teeth on Monday night and cut it close to the tooth, both front and back. Tuesday morning, put in two thicknesses; Tuesday night three thicknesses, and Wednesday morning four. Unless the teeth are very close together the patient can do this very easily. If too tight together for him to do it I use the immediate separator and put the first thickness in myself," etc.

An analysis of the above shows that the writer either scarcely read what Dr. Van Woert wrote, or else did not understand either the text or the illustrations. First he mentions that he had used the ligature silk "of which you speak" and had abandoned it for the tape. The tape, used as described by this gentleman is certainly effective and when first introduced to the profession, probably a quarter of a century ago, was an advance over previous methods, namely rubber, or orange-wood. But no one who had ever used the silk "of which Dr. Van Woert speaks," using it in the manner described in his paper, would ever have abandoned it for tape. It is probable that the writer, never having seen the silk of which Dr. Van Woert writes, has confounded it with silk used by dentists for ligaturing the rubber dam about the necks of teeth, whereas Dr. Van Woert was alluding to a French silk, now used by orthodontists in ligating teeth to orthodontic appliances. The common dental floss silk *stretches* when moistened, whereas this French silk *shrinks* when wet. Of this more presently.

Then the writer describes his way of using the tape. He gives it to the patient with instructions for removing and replacing three times. The method presented by Dr. Van Woert is such that the ligatures could be tied between the teeth in less time than would be required for explaining the tape method to the average patient. Moreover, the patient would not be burdened with any part of the work, but could go home

and forget all about the separation. Again, the separation will be between the proper teeth, which is not always true when put in by the patient. But finally, the writer admits that when the teeth are very tight together he uses an immediate separator and inserts the first tape himself. It is just these teeth that are very tight together that most need separating and the ligature could be applied painlessly in half the time needed to adjust the immediate separator, *which always causes pain.* If any dentist is inclined to dispute this, before doing so, let him have his assistant use the immediate separator in his own mouth.

A short time after the publication of Dr. Van Woert's paper Dr. Van Woert dined with a number of friends, all very prominent men. He was greeted with compliments on his paper, and then one after the other the men made remarks of this character: "That is a fine way to separate teeth; I have been doing it for twenty years!" "Say, Van Woert, that *is* a painless way to separate teeth, but what makes you think it is new?" "I am glad, Van Woert, that you have illustrated that use of the ligature for separating teeth; I have thought of describing that myself for years." "Oh! Van Woert, I am glad to see that you have at last discovered that you can separate teeth with silk. Sorry for your patients if you have been hammering orangewood between their teeth all these years!"

And so they all had a bit of fun with him for a while, but when they had taken their seats, Dr. Van Woert arose and said: "Now, my good friends, I'll wager a dinner for this party that not one of you ever has used that method of separating teeth; that you never have seen the silk; and that if I gave you a piece you would not know how to tie the knot, without again studying the illustrations."

The challenge rather sobered the company, and Dr. Van Woert then demonstrated the tying of the knot, using a bit of cord, and tying it between his fingers, whereupon all admitted that they never had used that particular silk in that particular way.

And that is "the milk in the cocoanut." The method depends for success upon the use of this particular silk, tied in this particular manner.

And this story demonstrates that even men of national reputation and of undoubted skill may read inattentively, and thus lose the point of the story.

Another correspondent wrote that the method is good, but old. He said that it had been given to the profession by Dr. J. Austin Dunn of Chicago, and could be found described in the *Dental Review* for 1892. This certainly was interesting because it was so precise. The reference was consulted, and it is an article half a page long, with two illustrations, so there can be no mistake about what is meant. It is the well-known method of placing a bit of absorbent cotton between the teeth, and tying the same with a silk ligature, which is passed under the cotton and then tied above the contact point. This also is a good method in many cases, but observe that it is the *cotton* that separates the teeth, the silk being used only to hold the cotton in place. In the new method, *for it is new,* it is the contraction of the ligature itself which spreads the teeth apart, and this is greatly aided by the method of tying.

To those who may think that the methods are the same, the following experiment is suggested. Take a sensitive miss of fourteen, with the second permanent molars *recently erupted.* Then endeavor to tie cotton, in the manner described in the *Dental Review,* first between the second bicuspid and the first molar, and then between the two molars. The experimenter will discover with what pleasure the patient will endure his efforts, first to place the ligature, and then to pack enough cotton between the tightly placed teeth so that it may subsequently be tied in place. For it is evident that where teeth are in very close contact, not very much cotton can be packed through the contact point; it must be poked under it, painfully disturbing the sensitive gingiva. On the other hand, it is but fair to state that in the presence of large cavities, this cotton method is most desirable, but it will be more efficacious used in conjunction with the method described by Dr. Van Woert than with ordinary dental floss.

History and Rationale of Separating Teeth.

It may be profitable to consider the various methods for separating teeth, which have been evolved. First we should take cognizance of the anatomy of the parts. We have to deal with two bony structures, set in bone, and surrounded by pericementum. Between these we find the gingiva filling the interproximal space. This space is triangular in form, the base of the triangle being

toward the soft tissue, and the apex at the contact of the two teeth. Pain is of two characters. It may result from exerting sudden and great stress against the pericementum, pinching it by forcing the tooth root against the socket wall. It may likewise be caused by stress against the soft tissues.

Probably the first attempt at making space was by driving a piece of wood between the teeth, the teeth moving apart through absorption of moisture and consequent swelling of the wood.

Then we had the use of pure rubber wedges. (The exact sequence of these two methods is not important.) The rubber wedge spread the teeth by exerting elastic force. These two methods had a fault in common. When first inserted, the wooden or the rubber wedge is held in place between the contact points, but as the teeth yield there is a tendency, greater in the rubber than in the wood, for the wedge to slide toward the base of the triangle, thus impinging against the soft tissue, causing pain, and often serious injury.

Next (probably) we had the absorbent cotton wedge, first used in the form of a twist, or rope, inserted dry, and later packed between the teeth after first impregnating it lightly with sandarach varnish. Following this, of course, came the more efficient method of tying the cotton to place with silk ligature. This not only kept the cotton in position, but was supposed to force it toward the contact point and keep it away from the soft tissues. It is this feature which becomes more efficacious when the new silk, which *shrinks,* is used instead of dental floss which *stretches.*

Coincidentally, or immediately after the cotton wedge, came the wedge with tape. All improvements in methods are by evolution, and it is a common rule with historians to determine priority of invention or construction by deciding which is the more primitive, the improved product usually coming last. Thus it is likely that the cotton wedge antedated the tape, the latter being adopted because it could more easily be forced between two teeth, while being made of cotton would have the same force in spreading by swelling upon absorption of moisture.

Then, just as the cotton wedge was steeped in sandarach to keep it from becoming foul, someone in the West dipped cotton tape in wax, and waxed tape is still much used in Chicago and vicinity. In New England,

Dr. Frank Blivin, of Worcester, presented a tape steeped in gutta percha, which is better than any other tape method.

The various steel appliances for immediate separation are familiar to all, but can scarcely be considered in a discussion of painless separation of the teeth.

Orthodontic Methods of Separation.

It will be observed that all the methods thus far mentioned have been used mainly for separating teeth which need filling. But the orthodontist often found that it would be easier to fit molar bands if he might first obtain a little space. He also quite quickly discovered that none of the existing methods would serve to open the space mesially of the first molar, and more especially the space distal to that tooth. Men who at that period were using the Angle method of ligating the teeth to the expansion arches with wire ligatures, would pass a wire ligature under the contact points, bring the end out buccally and twist the two ends tight, thus contracting the ligature around the contact points. This was effective, even though not always painless. For in this connection there is an axiom that should never be forgotten:

When the greatest stress is made to bear against the greatest resistance, the maximum of pain is caused.

Measured by this rule, the method is faulty, because the ligature is tied as tight as possible at the moment of its application, and at that same moment, of course, the teeth and adjacent parts are offering the greatest resistance.

But it was effective in that it did open a slight space, and that it did no injury to the soft tissues.

About five or six years ago Dr. J. Lowe Young introduced to orthodontists a silk which he had obtained from France, which, unlike any other silk, would shrink when brought into contact with moisture. This at once introduced a valuable ligature, which, unlike the wire ligature which will loosen as a tooth moves, will keep tight by contracting.

It was not strange that men who adopted this silk ligature in orthodontia should essay to separate teeth with it, as they had been doing with the wire ligature, by tying it around the molar contact points.

The writer, in attempting to do this, soon discovered two things: first, that whereas it is often difficult to force even a wire ligature under

the contact points, it is almost never possible to do so with the silk, as it would not be stiff enough. Again, it could not be forced down between and past the contact points, because it is too stiff or too hard. In this dilemma he thought of an old trick that he had used for a totally different purpose, and by looping the *hard* silk into a loop of dental floss, which is *soft,* the softer silk could be easily forced down between the contact points, after which the looped end of the harder silk could be drawn through (see illustration in January issue). With the silk in this position, it was seen at once that instead of drawing one strand of the silk through, and then tying it around the contact points single, as had been the custom with the wire ligature, it would be easier, and doubly effective to utilize the loop, pass one end through, draw it tight, and tie. By this means we have two thicknesses of the ligature, and the loops of the silk under the contact point, contracting as they do in opposite directions, greatly enhances the force exerted.

This method of separating, used first for opening spaces for molar bands, was subsequently tried in operative procedures, with such success that it was communicated to friends. Among orthodontists it was found that other men had arrived at the same method, by exactly similar processes of reason applied to every-day work. Hence, it is impossible to say what man actually did it first, nor is that a matter of any great consequence.

What is of importance is the undoubted fact that it is the most effective and most painless method of separating teeth yet introduced. The silk is to be obtained in various sizes, and is effectual for separating teeth in sizes Nos. 3, 4 and 5. No. 5 silk may be used on both sides of a sixth year molar, and on both sides of the jaw (or on both jaws, on one side)—thus introducing four separations at the same time, in the mouths of sensitive children with protests rare, while the space obtained will always be adequate. The No. 5 silk is rather coarse for incisors, but the finer silks operate similarly. Where cavities are present, they may be first filled with gutta percha, or Dr. Dunn's method of placing absorbent cotton within the tie of the ligature may be adopted.

But again we say this method, which involves use of this particular silk tied in the manner described and illustrated in the January issue, is the best and most painless method of separating teeth yet evolved. It is

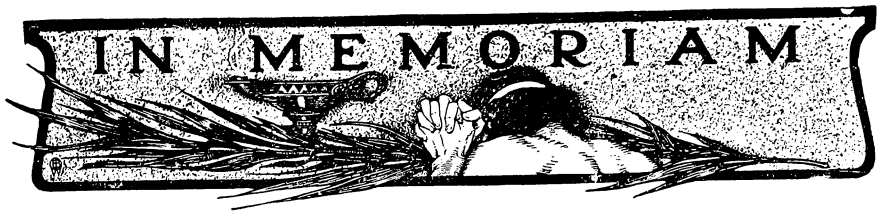
effective because results may be obtained in twenty-four hours or less. It is painless because it obeys the following axiom:

If we introduce the least stress against the greatest resistance in such a manner as to produce a slowly increasing stress against a slowly decreasing resistance, we attain our end with the minimum of pain.

This ligature tied as described exerts a slight stress only at first, but this stress slowly increases, and as the teeth slowly move apart we have a slowly decreasing resistance. Moreover, there is no pressure against the gingiva.

Dr. Norman W. Kingsley Dead

Dr. Norman W. Kingsley died on the morning of Thursday, February 20th after a brief illness. He did not suffer, and was conscious of the approaching end, and thoroughly resigned. His marvelous mind was the last part of him to succumb. Within a few hours of his death he dictated letters and gave names and addresses of those to whom he wished messages and notices of his death sent. His last task finished he folded his arms and waited, saying, "I have no more work to do in this world." An obituary will appear in our next issue.



Resolutions on the Death of Dr. Wilbur F. Litch.

Whereas, It is our sad duty to record the death, December 25, 1912, of our fellow member, Dr. Wilbur F. Litch.

Whereas, Throughout his long, busy and honorable life Dr. Litch has ever been a patriotic citizen. His scholarly attainments; his ability as a writer, editor and teacher; his skill as a practitioner and his keen interest in professional affairs have placed him foremost among the eminent men who have graced the dental profession.

Resolved, That we, the members of the Pennsylvania Association of Dental Surgeons, feeling deeply the loss we have sustained, hereby express our appreciation and our sorrow over the close of a noble career. And be it

Resolved, That these resolutions be spread upon our minutes and a copy be sent to his widow and to the prefessional journals for publication.

WILLIAM H. TRUEMAN,
J. FREDERICK WESSELS,
J. CLARENCE SALVAS,
Committee.

At a meeting of the Eastern Dental Society, the following resolutions on the death of Dr. Wilbur F. Litch were adopted:

Whereas, Death has removed from our midst our beloved teacher and friend, Dr. Wilbur F. Litch,

And Whereas, The Eastern Dental Society, of Philadelphia, wishing to express its sorrow at the loss of an esteemed teacher and friend, under whose guidance most of the members have received their professional training,

Be It Resolved, That we, the members of the Eastern Dental Society, do express our deep sorrow at the death of Dr. Wilbur F. Litch, the loss of whom will be keenly felt by the dental profession, and whose loving, kind treatment and beneficent influence cannot be forgotten by those who were fortunate enough to come in contact with him,

And Be It Further Resolved, That a copy of these resolutions be spread upon the minutes of the society and that copies be sent to the journals for publication.

CHARLES B. SCHUPACK, D.D.S., DAVID FELDMAN, D.D.S., Committee.

SOCIETY ANNOUNCEMENTS

National Society Meetings.

NATIONAL DENTAL ASSOCIATION, Kansas City, Mo., July, 1913.

AMERICAN SOCIETY OF ORTHODONTISTS, Chicago, Ill., July, 1913.

INSTITUTE OF DENTAL PEDAGOGICS, Buffalo, N. Y., January, 1914.

State Society Meetings.

ARIZONA DENTAL SOCIETY, Phœnix, Ariz., November, 1913. Secretary, Dr. H. H. Wilson, Phœnix, Ariz.

ARKANSAS STATE DENTAL ASSOCIATION, Little Rock, Ark., April 7, 8, 9, 10, 11, 1913. Secretary, Dr. I. M. Sternberg, Ft. Smith, Ark.

CALIFORNIA STATE DENTAL ASSOCIATION, Oakland, Cal., June 2, 3, 4, 5, 1913. Secretary, Dr. E. E. Evans, Oakland, Cal.

CONNECTICUT STATE DENTAL ASSOCIATION, Waterbury, Conn., April 15, 16, 1913. Secretary, Dr. A. V. Prentis, New London, Conn.

GEORGIA STATE DENTAL SOCIETY, Columbus, Ga., June 12, 13, 14, 1913. Secretary, Dr. DeLoss L. Hill, Grant Bldg., Atlanta, Ga.

ILLINOIS STATE DENTAL SOCIETY, Peoria, Ill., May 13, 14, 15, 16, 1913. Secretary, Dr. H. L. Whipple, Quincy, Ill.

INDIANA STATE DENTAL ASSOCIATION, Indianapolis, Ind., May 20, 21, 22, 1913. Secretary, Dr. Otto U. King, Huntington, Ind.

KENTUCKY STATE DENTAL ASSOCIATION, Lexington, Ky., May 26, 27, 28, 1913. Secretary, Dr. C. R. Shacklette, The Atherton, Louisville, Ky.

MASSACHUSETTS DENTAL SOCIETY, Boston, Mass., May 8, 9, 10, 1913. Secretary, Dr. A. H. St. C. Chase, Everett, Mass.

MICHIGAN STATE DENTAL SOCIETY, Grand Rapids, Mich., April 10, 11, 12, 1913. Secretary, Dr. F. Ward Howlett, Jackson, Mich.

MINNESOTA STATE DENTAL ASSOCIATION, Secretary, Dr. Benjamin Sandy, Syndicate Bldg., Minneapolis, Minn.

MISSISSIPPI DENTAL ASSOCIATION, Meridian, Miss., June 24, 25, 26, 1913. Secretary, Dr. L. B. Price, Corinth, Miss.

MISSOURI STATE DENTAL ASSOCIATION, Kansas City, Mo., July, 1913. Secretary, Dr. S. C. A. Rubey, Warrensburg, Mo.

NEBRASKA STATE DENTAL SOCIETY, Omaha, Nebr., May 19, 20, 21, 22, 1913. Secretary, Dr. Wm. A. McHenry, Nelson, Nebr.

NEW YORK STATE DENTAL SOCIETY, Albany, N. Y., May 8, 9, 10, 1913. Secretary, Dr. A. P. Burkhart, 52 Genesee St., Auburn, N. Y.

NORTH CAROLINA DENTAL SOCIETY, Winston-Salem, N. C., May 28, 29, 30, 1913. Secretary, Dr. J. M. Fleming, Raleigh, N. C.

NORTH DAKOTA DENTAL ASSOCIATION, Fargo, N. Dak., May 13, 14, 1913. Secretary, Dr. E. N. Hegge, Hatton, N. Dak.

PENNSYLVANIA STATE DENTAL SOCIETY, Philadelphia, Pa., June 24, 25, 26, 1913. Secretary, Dr. L. M. Weaver, 7103 Woodland Ave., Philadelphia, Pa.

SOUTH CAROLINA STATE DENTAL ASSOCIATION, The Isle of Palms, June 25, 26, 27, 1913. Secretary, W. Busey Simmons, Piedmont, S. C.

TENNESSEE STATE DENTAL ASSOCIATION, Nashville, Tenn. Secretary, Dr. C. O. Rhea, Nashville, Tenn.

TEXAS STATE DENTAL ASSOCIATION, Temple, Texas, May 15, 16, 17, 1913. Secretary, Dr. J. G. Fife, Dallas, Texas.

VERMONT STATE DENTAL SOCIETY, Burlington, Vt., May 21, 22, 23, 1913. Secretary, Dr. P. M. Williams, Rutland, Vt.

VIRGINIA STATE DENTAL SOCIETY. Secretary, Dr. C. B. Gifford, Taylor Bldg., Norfolk, Va.

WISCONSIN STATE DENTAL SOCIETY, Madison, Wis., July 8, 9, 10, 1913. Secretary, Dr. O. G. Krause, Wells Bldg., Milwaukee, Wis.

Institute of Dental Pedagogics.

At the annual meeting of the Institute of Dental Pedagogics, held at Pittsburgh, Pa., January 28th, 29th and 30th, the following officers were elected for the ensuing year:

President, Dr. D. H. Squires, Buffalo, N. Y.

Vice-President, Dr. Fred W. Gethro, Chicago, Ill.

Secretary-Treasurer, Dr. J. F. Biddle, 517 Arch Street, N. S., Pittsburgh, Pa.

Executive Board: Dr. H. M. Semans, Columbus, Ohio; Dr. S. W. Bowles, Washington, D. C.; Dr. A. W. Thornton, Toronto, Canada.

The next annual meeting will be held in Buffalo, New York, during last week of January, 1914.

Massachussetts Dental Society.

The forty-ninth annual meeting of the Massachusetts Dental Society will be held at the Hotel Sommerset, Boston, Mass., on Thursday, Friday and Saturday, May 8, 9 and 10, 1913.

A. H. St. C. Chase, Secretary.

Everett, Mass.

Susquehanna Dental Association of Pennsylvania.

The fiftieth anniversary meeting of the Susquehanna Dental Association of Pennsylvania will be held at Irem Temple, Wilkes-Barre, Pa., Tuesday, Wednesday and Thursday, May 20, 21 and 22, 1913.

All ethical practitioners are invited to attend.

The executive committee is comprised of the following members: Drs. A. E. Bull, T. W. Thomas, W. E. Davis, B. A. Courtright, A. J. Heffernan, T. L. Davenport, of Wilkes-Barre, Pa.; A. B. Miller, Kingston, Pa.; I. H. Jennings, of Danville.

E. J. Donnegan, Recording Secretary.

People's Bank Bldg., Scranton, Pa.

Illinois State Board of Dental Examiners.

The semiannual meeting of the Illinois State Board of Dental Examiners, for the examination of applicants for a license to practice dentistry in the State of Illinois, will be held at the Chicago College of Dental Surgery, corner of So. Wood and W. Harrison Streets, Chicago, beginning Wednesday, June 4, 1913, at 9 A.M.

All applications, together with the fees, twenty-six dollars ($26.00), must be filed with the secretary at least five (5) days prior to date of examination. Address all communications to

T. A. Broadbent, Secretary.

705 Venetian Building, Chicago, Ill.

New Mexico Board of Dental Examiners.

The New Mexico Board of Dental Examiners will meet in Albuquerque, July 3, 1913, for the examination of applicants to practice dentistry in New Mexico. Applications must be filed with the secretary at least ten days before the date of meeting, for application blanks and rules governing examinations apply to

M. J. Moran, Secretary.

Deming, New Mexico.

The Oklahoma State Dental Association's Post-Graduate School.

(The dental meeting that is different from others.)

The second annual session of the Oklahoma State Dental Association's Post-Graduate School will be held in Oklahoma City, March 24 to 29, 1913.

The lecturers and demonstrators are to be: Dr. Thos. P. Hinman, of Atlanta, Ga.; Dr. J. V. Conzett, of Dubuque, Iowa, and Dr. Martin Dewey, of Kansas City, Mo.

The course will consist of about eighteen lectures, and many practical demonstrations in operative dentistry, prosthetic dentistry, crown and bridgework, and orthodontia.

All ethical dentists are eligible to take the course, and dentists from other States are cordially invited to the meeting, but will be expected to pay a membership fee.

For any information address

C. R. LAURENCE.

Enid, Okla.

Texas State Dental Association.

The thirty-third annual meeting of the Texas State Dental Association will be held at Temple, Texas, May 15, 16, 17, 1913. The clinic will be in charge of Dr. J. O. Hall, Waco, Texas, who will furnish any information relative to same. Exhibitions desiring space will please address Dr. J. M. Murphy, Temple, Texas.

All ethical members of the profession are cordially invited to attend the meeting. Any other information will be cheerfully furnished by the secretary.

GUY MORGAN, President, Waco, Texas.

J. G. FIFE, Secretary, Dallas, Texas.

Nebraska State Dental Society

(Change in date of meeting)

The thirty-seventh annual meeting of the Nebraska State Dental Society will be held in Omaha, May 19, 20, 21 and 22, 1913, instead of May 12, 13, 14 and 15, 1913, as formerly announced. For programs and any information address

WM. A. MCHENRY, Secretary.

Nelson, Nebr.

Kentucky State Dental Association.

The forty-fourth annual meeting of the Kentucky State Dental Association will be held at the Phœnix Hotel, in Lexington, Ky., on May 26, 27 and 28, 1913. All ethical dentists are invited to attend.

C. R. SHACKLETTE, Secretary.

The Atherton, Louisville, Ky.

California State Dental Association

The next annual meeting of the California State Dental Association will be held on June 2, 3, 4 and 5, in the Hotel Oakland, at Oakland, Cal.

E. E. EVANS, Secretary.

Oakland, Cal.

South Carolina State Dental Association

The forty-third annual meeting of the South Carolina State Dental Association will be held on the Isle of Palms, June 25, 26 and 27, 1913.

W. BUSEY SIMMONS, Recording Secretary.

Piedmont, S. C.